

# UNINTERRUPTIBLE POWER SUPPLY

## SLC TWIN

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## UNINTERRUPTIBLE POWER SUPPLY



**SLC TWIN series from 0.7  
to 3 kVA**



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## 1. INTRODUCTION.

### 1.1. GRATEFULNESS LETTER.

We would like to thank you in advance for the trust you have placed in us by purchasing this product. Read this instruction manual carefully before starting up the equipment and keep it for any possible future consult that can arise.

We remain at your entire disposal for any further information or any query you should wish to make.

Yours sincerely,

**SALICRU**

- The equipment here described can cause important physical damages due to wrong handling. Due to this, the maintenance and/or fixing of the here described equipment must be done by SALICRU staff or specifically authorised.
- According to our policy of constant evolution, we reserve the right to modify the specifications in part or in whole without forewarning.
- All reproduction or third party concession of this manual is prohibited without the previous written authorization of our firm.

## 1.2. USING THIS MANUAL.

The purpose of this manual is to provide explanations and procedures for the installation, commissioning, maintenance and troubleshooting of UPS from SLC TWIN series. This manual has to be read carefully before installing and operating it. Keep this manual for future consults.

### 1.2.1. Used symbols and conventions.



«**Warning**» symbol. Carefully read the indicated paragraph and take the stated prevention measures.



«**Danger of electrical discharge**» symbol. Pay special attention to it, both in the indication on the equipment and in the paragraph referred to this user's manual.



«**Main protective earthing terminal**» symbol. Connect the earth cable coming from the installation to this terminal.



«**Notes of information**» symbol.



**Preservation of the environment:** The presence of this symbol in the product or in their associated documentation states that, when its useful life is expired, it will not be disposed together with the domestic residuals. In order to avoid possible damages to the environment, separate this product from other residuals and recycle it suitably. The users can contact with their provider or with the pertinent local authorities to be informed on how and where they can take the product to be recycled and/or disposed correctly.

### 1.2.2. For further information and/or help.

For further information and/or help on the version of your specific unit, request it to our Service and Technical Support department (**S.T.S.**).

## **2. QUALITY AND STANDARD GUARANTEING.**

## **2.1. MANAGEMENT DECLARATION.**

Our target is the client's satisfaction, therefore this Management has decided to establish a Quality and Environmental policy, by means of installation a Quality and Environmental Management System that becomes us capable to comply the requirements demanded by both the standards **ISO 9001:2000** and **ISO 14001:2004** and our Clients and concerned parts too.

Likewise, the SALICRU Management is committed with the development and improvement of the Quality and Environmental Management System, through:

- The communication to all the company about the importance of satisfaction both in the client's requirements and in the legal and regulations.
  - The Quality and Environmental Policy diffusion and the fixation of the Quality and Environment targets.
  - To carry out revisions by the Management.
  - To provide the needed resources.

#### **Management agent**

The Management has designated as management agent the person in charge about the Quality and Environment department, who with independence of other responsibilities, has the responsibility and authority: to assure that the processes of the quality and environmental management system are established and maintained; to inform to the Management about the operating of the quality and environmental management system, including the necessities for the improvement; and to promote the knowledge of the client's requirements and environmental requirements at all levels of the organization.

In the next PROCESS MAP is represented the interaction among all the processes of the Quality and Environmental System of **SALICRU**:



**Fig. 0.** Process map

## 2.2. STANDARD.

The UPS product **SLC TWIN** series is designed, manufactured and commercialized in accordance with the standard **EN ISO 9001** of Quality Assurance. The marking shows the conformity to the EEC Directive (quoted between brackets) by means of the application of the following standards:

- Safety:  
220V models: IEC/EN62040-1-1  
110V models: UL1778
  - Electromagnetic compatibility (EMC):  
220V models: IEC/EN62040-2.....Category C1  
110V models:: FCC PART 15.....Class B

## **2.3. SAFETY AND FIRST AID.**

Together with the equipment and this «User and installation manual», it is provided the information relating to «Safety instructions» (See document EK266\*08). Before proceeding to the installation or commissioning, check that both information are available; otherwise request them. It is compulsory the compliance of the «Safety instructions», being the user the legal responsible regarding to its observance. Once read, keep them for future consults that can arise.

## 2.4. ENVIRONMENT.

This product has been designed to respect the environment and has been manufactured in accordance with the standard **ISO 14001**

**Recycling the UPS SLC TWIN series at the end of its useful life:**  
**SALICRU** commits to use the services of authorised societies and according to the regulations, in order to treat the recovered product at the end of its useful life (contact your distributor).

Packing:

To recycle the packing, follow the legal regulations in force.

### Batteries

**Batteries.**  
The batteries mean a serious danger for health and environment.  
The disposal of them must be done in accordance with the standards in force..

### 3. PRESENTATION.

This manual describes the installation and operating of the **SALICRU** Uninterruptible Power Supply (UPS) of **SLC TWIN** series. The UPSs **SLC TWIN** series ensure an optimal protection for any critical load, keeping the AC mains to the loads between the requested parameters and with no-break, during the fault, deterioration or fluctuations of the electrical commercial mains and with the available models (from 0.7 kVA to 3 kVA) allow adapting the model the end-user's needs.

The UPS design and construction from **SLC TWIN** series has been done in accordance with the international standards and also they can be supplied in 19" rack format.

Thanks to the PWM (Pulse Width Modulation) technology used in the UPSs of **SLC TWIN** series, they are compacts, colds, silent and with high efficiency.

Therefore, this series has been designed to maximize the availability of the critical loads and to ensure that your business is protected from fluctuations of voltage, frequencies, electrical noises, black-outs and mains faults, which are present in the energy distribution mains. This is the essential target of the UPSs of **SLC TWIN** series.

This manual is applicable to the following models:

Model	Power (VA)	Type
<b>SLC-700-TWIN</b>	700	Standard
<b>SLC-1000-TWIN</b>	1000	
<b>SLC-1500-TWIN</b>	1500	
<b>SLC-2000-TWIN</b>	2000	
<b>SLC-3000-TWIN</b>	3000	
<b>SLC-700-TWIN B1</b>	700	Standard with extended autonomy
<b>SLC-1000-TWIN B1</b>	1000	
<b>SLC-1500-TWIN B1</b>	1500	
<b>SLC-2000-TWIN B1</b>	2000	
<b>SLC-3000-TWIN B1</b>	3000	
<b>SLC-700-TWIN R</b>	700	Rack 19"
<b>SLC-1000-TWIN R</b>	1000	
<b>SLC-1500-TWIN R B0</b>	1500	
<b>SLC-2000-TWIN R B0</b>	2000	
<b>SLC-3000-TWIN R B0</b>	3000	
<b>SLC-700-TWIN R B1</b>	700	Rack 19" with extended autonomy
<b>SLC-1000-TWIN R B1</b>	1000	
<b>SLC-1500-TWIN R B1</b>	1500	
<b>SLC-2000-TWIN R B1</b>	2000	
<b>SLC-3000-TWIN R B1</b>	3000	

**Table 1.** Standardized basic models

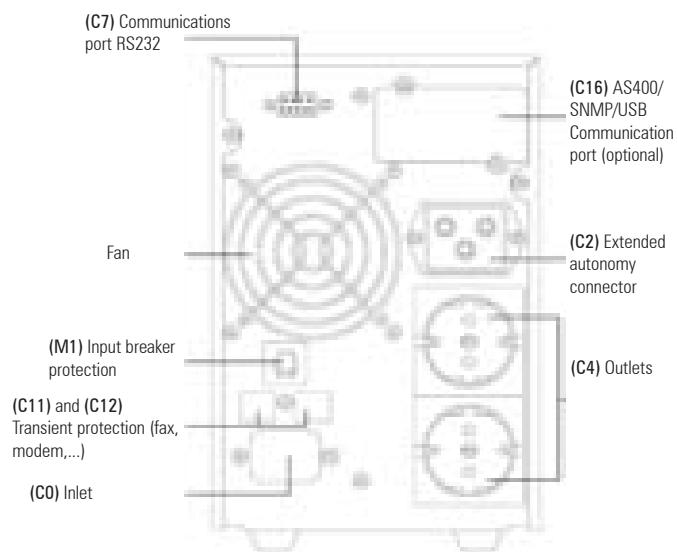
### 3.1. VIEWS.

#### 3.1.1 Views and legends.

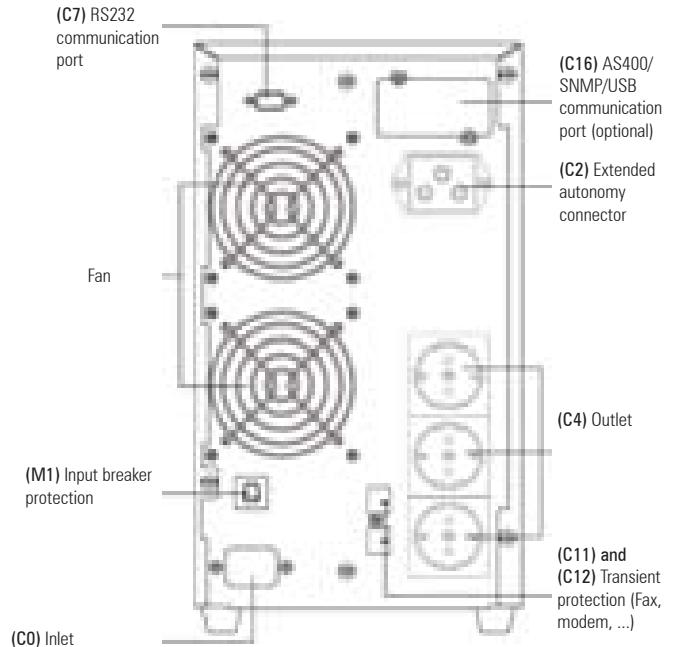
Symbols and their meaning			
Symbol	Meaning	Symbol	Meaning
	Warning		Earth
	Hihg voltage		Silenced alarm
	UPS ON / Battery test		Overload
	UPS OFF		Battery
	UPS on standby or shutdown		Recycling
	Alternating (AC)		Keep the UPS in a cooled place
	Direct (DC)		

**Table 2.** Symbols used in the equipment and/or this manual.

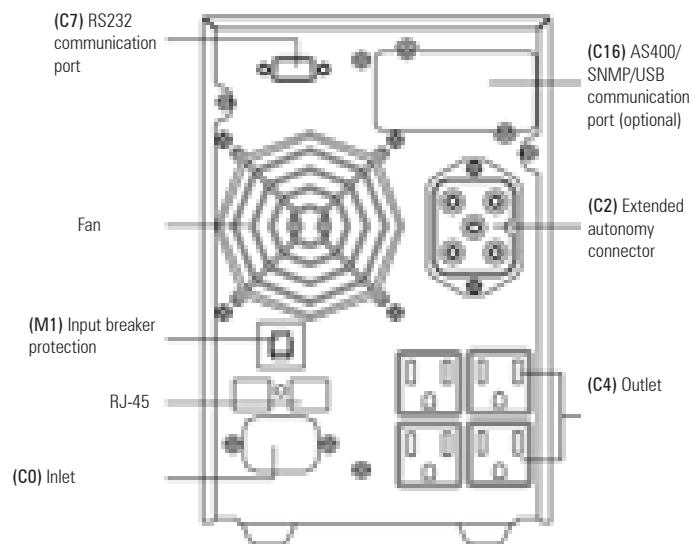
### 3.1.2. Rear, description and connectivity.



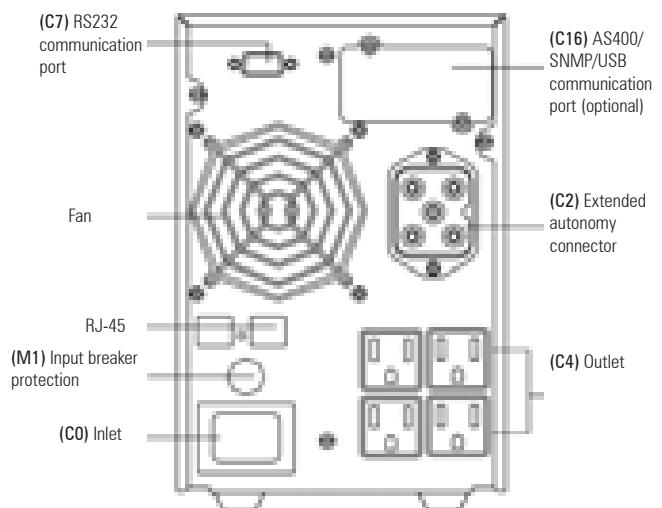
**Fig. 1.** Rear view SLC-700 and 1000-TWIN / -TWIN B1 to 208 / 220 / 230 / 240 VAC



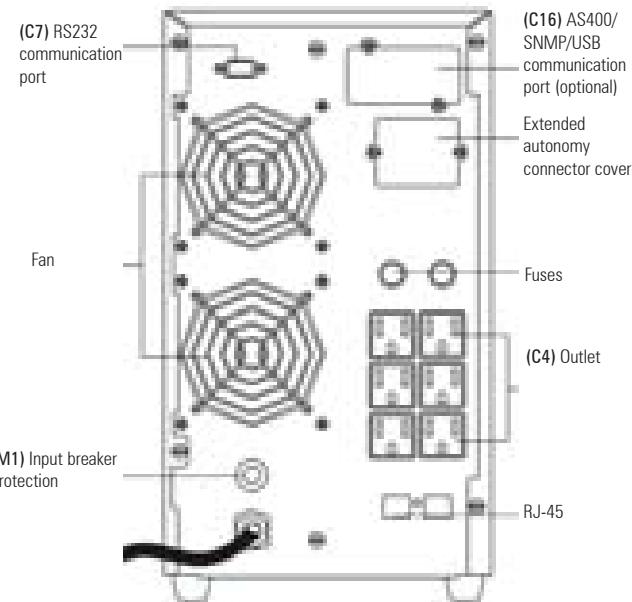
**Fig. 3.** Rear view SLC-1500 and 2000-TWIN to 208 / 220 / 230 / 240 VAC



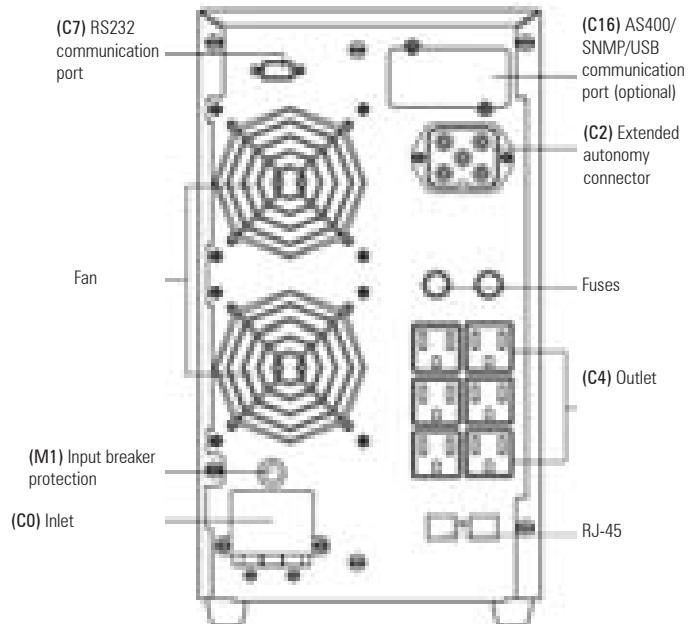
**Fig. 2.** Rear view SLC-700 and 1000-TWIN / -TWIN B1 to 110 / 115 / 120 / 127 VAC



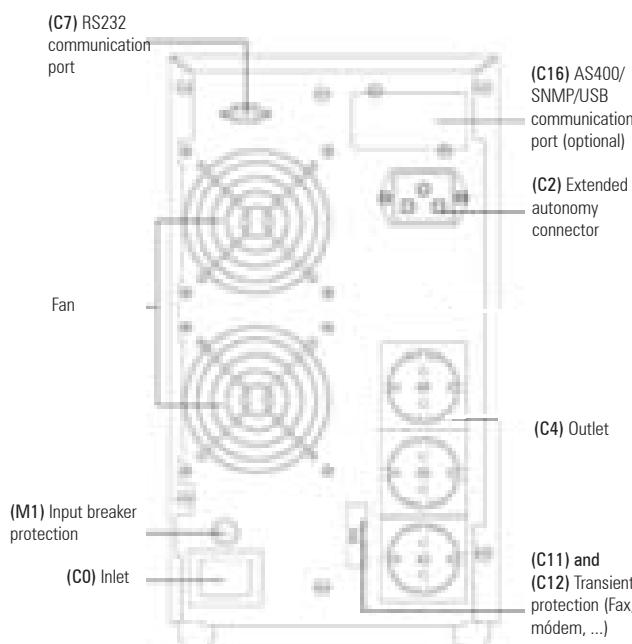
**Fig. 4.** Rear view SLC-1500-TWIN / -TWIN B1 to 110 / 115 / 120 / 127 VAC



**Fig. 5.** Rear view SLC-2000 and 3000-TWIN to 110 / 115 / 120 / 127 VAC



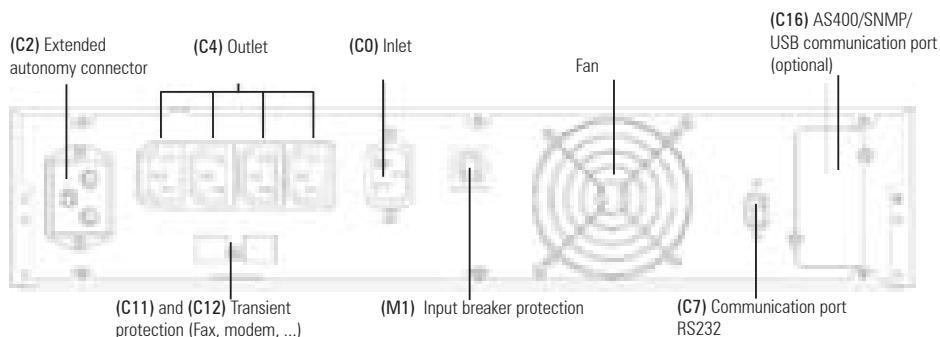
**Fig. 7.** Rear view SLC-2000 and 3000-TWIN / -TWIN B1 to 110 / 115 / 120 / 127 VAC



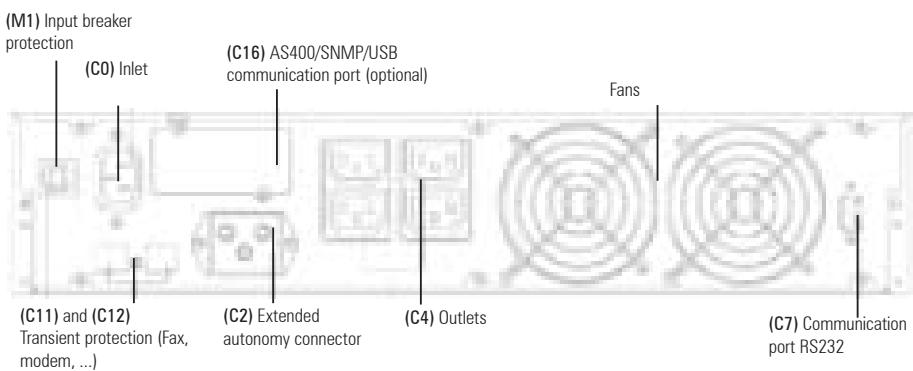
**Fig. 6.** Rear view SLC-3000-TWIN to 208 / 220 / 230 / 240 VAC

## Rack 19" models for 208 / 220 / 230 / 240 VAC equipments

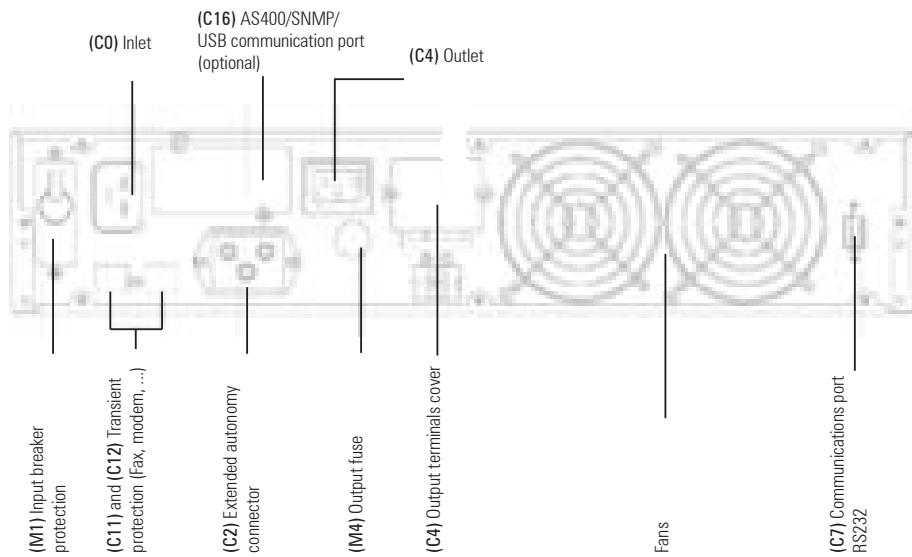
Later there appear the back panels of the SAI and the packaging battery for 220Vac input equipments. All the conectors of input and output and some other usefull one are in the rear panel.



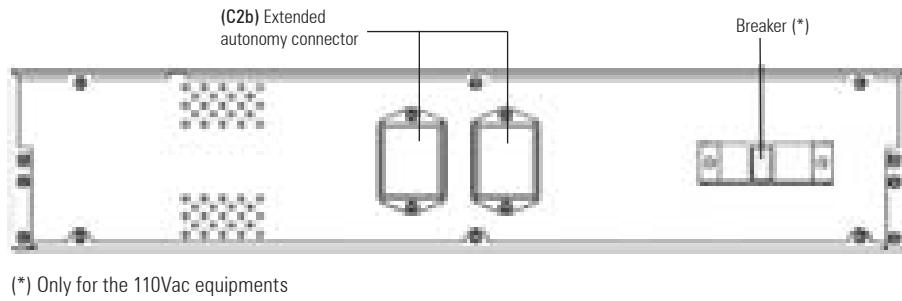
**Fig. 8.** Rear view SLC-700 and 1000-TWIN R / TWIN R B1



**Fig. 9.** Rear view SLC-1500 and 2000-TWIN R



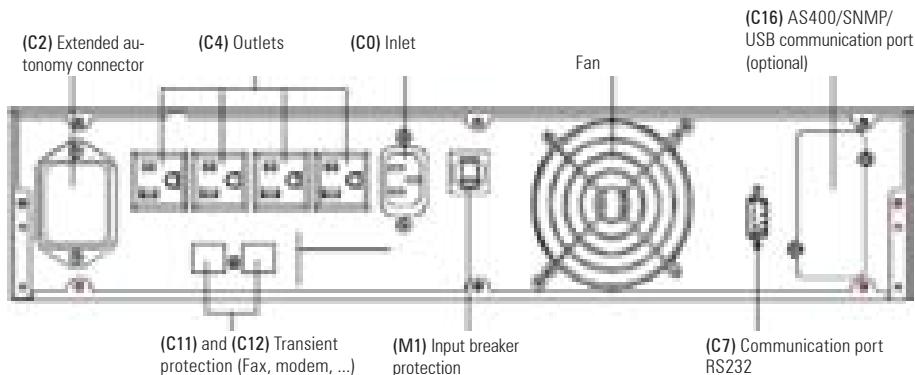
**Fig. 10.** Rear view SLC-3000-TWIN R and 1500, 2000, 3000-TWIN R B1



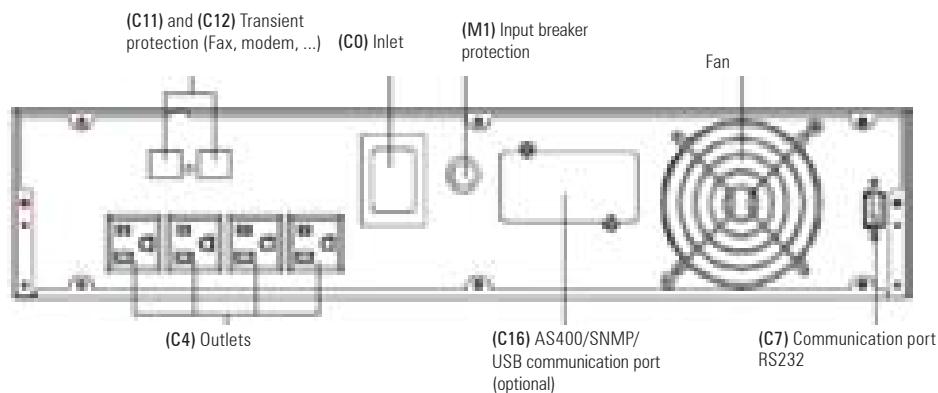
**Fig. 11.** Rear view battery module R models

#### Rack 19" models for 110 / 115 / 120 / 127 VAC equipments

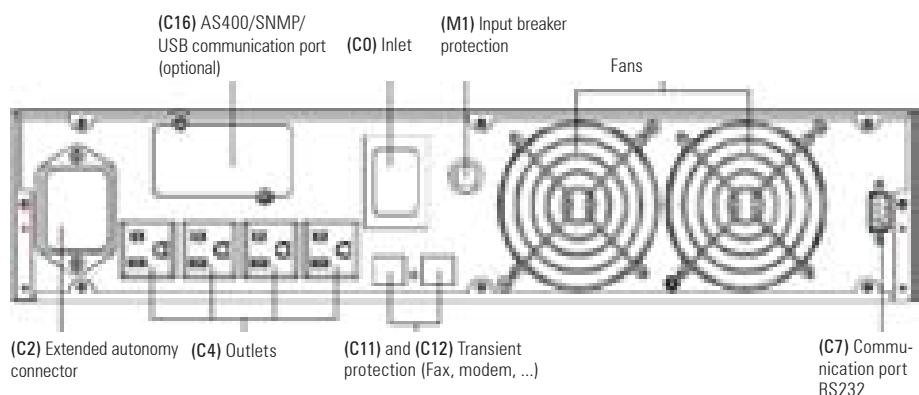
Later there appear the back panels of the SAI and the packaging battery for 110Vac input equipments. All the conectores of input and output and some other usefull one are in the rear panel.



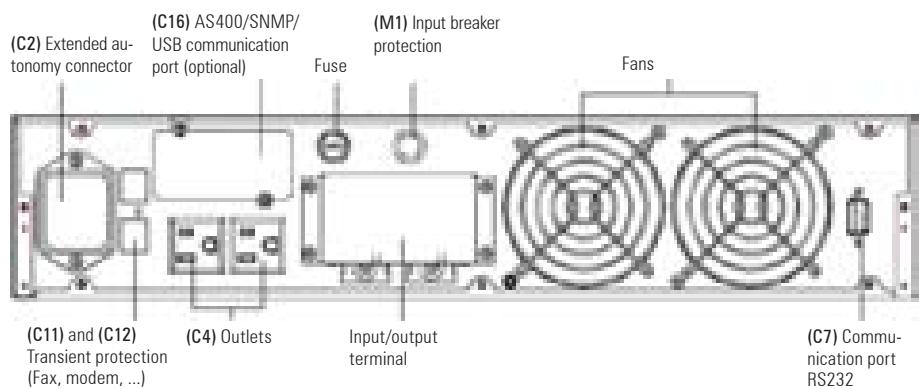
**Fig. 12.** Rear view SLC-700 and 1000-TWIN R B1



**Fig. 13.** Rear view SLC-1500-TWIN R

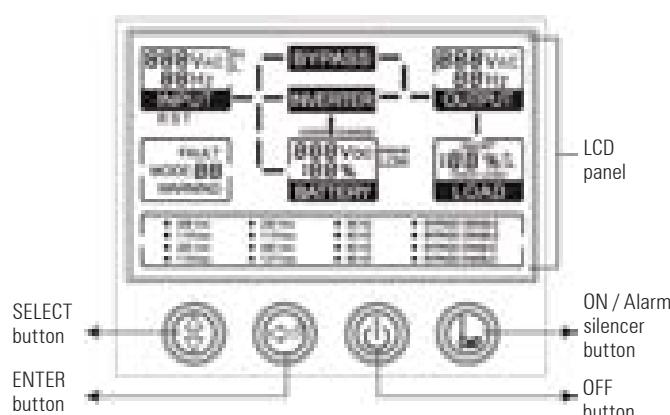


**Fig. 14.** Rear view SLC-1500-TWIN R B1



**Fig. 15.** Rear view SLC-2000 and 3000-TWIN R B1

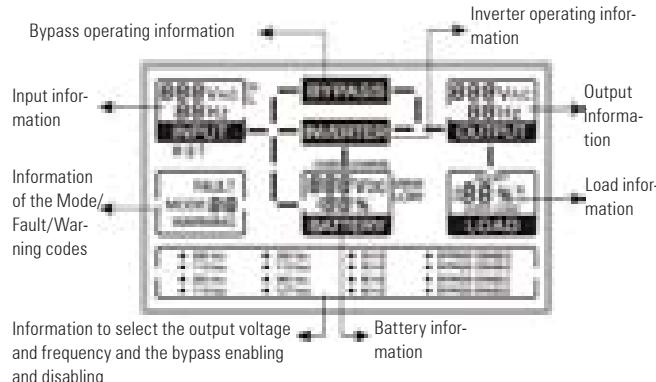
### 3.1.4. Control panel.



**Fig. 16.** Control panel. Tower type model.

Button	Function
<b>ON button</b>	By pressing the ON button, the UPS starts up, the acoustic alarm is deactivated and it is done a battery test.
<b>OFF button</b>	By pressing the OFF button, the UPS goes to bypass mode and the inverter is shutdown. From now on, if the bypass and mains are active, the output terminals supply voltage through themselves.
<b>SELECT button</b>	The output voltage, frequency and the bypass enabling/disabling can be selected if the UPS is on bypass mode and by pressing the SELECT button and confirming by pressing ENTER.
<b>ENTER button</b>	

**Table 3.** Functions of each button.



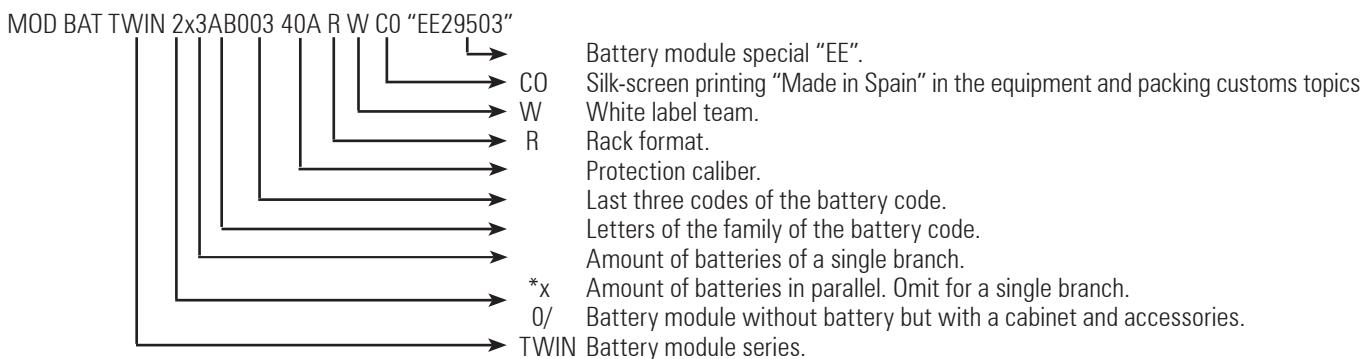
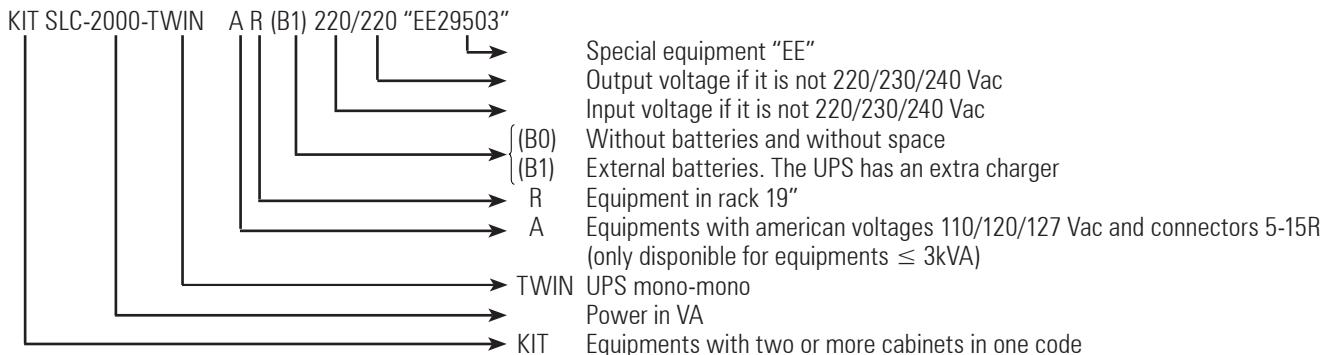
**Fig. 17.** LCD panel description

Display	Function
<b>Input information</b>	
<b>888 V<sub>AC</sub></b>	It displays the input voltage value, which will be showed from 0 to 999 Vac
<b>88 Hz</b>	It displays the frequency value of the input voltage, which will be showed from 0 to 99 Hz
<b>H</b>	It displays that the input voltage is higher than the SPEC range and the UPS runs on battery mode.
<b>L</b>	It displays that the input voltage is lower than the SPEC range and the UPS runs on battery mode.
<b>Output information</b>	
<b>888 V<sub>AC</sub></b>	It displays the output voltage value, which will be showed from 0 to 999 Vac.
<b>88 Hz</b>	It displays the frequency value of the output voltage, which will be showed from 0 to 99 Hz.
<b>Load information</b>	
<b>188 %</b>	It displays the % of the load in W or VA, the maximum value will be showed from 0 to 199% only.
<b>SHORT</b>	It displays that the output is short-circuited and the UPS could be shutdown.
<b>OVERLOAD</b>	It displays that the load overcomes the SPEC range.
<b>Battery information</b>	
<b>888 V<sub>DC</sub></b>	It displays the battery voltage value, which will be showed from 0 to 999 Vdc.
<b>188 %</b>	It displays the % of the battery capacity, which will be showed from 0 to 199%
<b>OVER CHARGE</b>	It displays that the battery is overcharged, and the UPS could transfer to battery mode.
<b>LOW</b>	It displays that the battery is low and the UPS could be shutdown shortly.
<b>Information of Mode/Fault/Warning codes</b>	
<b>FAULT MODE 88 WARNING</b>	It displays the UPS operating mode. It will show the Mode/Fault/Warning codes, which are identified in table 8 of chapter 5.
<b>Inverter operating information</b>	
<b>INVERTER</b>	It displays that the inverter is running.
<b>Bypass operating information</b>	
<b>BYPASS</b>	It displays that the bypass is activated.
<b>Information of output voltage and frequency and bypass enabling / disabling</b>	
<b>110V<sub>AC</sub>, 115V<sub>AC</sub>, 120V<sub>AC</sub>, 127V<sub>AC</sub>, 208V<sub>AC</sub>, 220V<sub>AC</sub>, 230V<sub>AC</sub>, 240V<sub>AC</sub></b>	They are the eight selectable output voltage values with the UPS on standby or bypass mode. One of them can be activated at the same time only..
<b>50 Hz</b>	
<b>60 Hz</b>	They are the two selectable frequency values of the output voltage with the UPS on standby or bypass mode. One of them can be activated at the same time only.
<b>Bypass disable</b>	Selection of bypass enabled/disabled with the UPS on standby or bypass mode. One of them can be activated at the same time only.
<b>Bypass enable</b>	

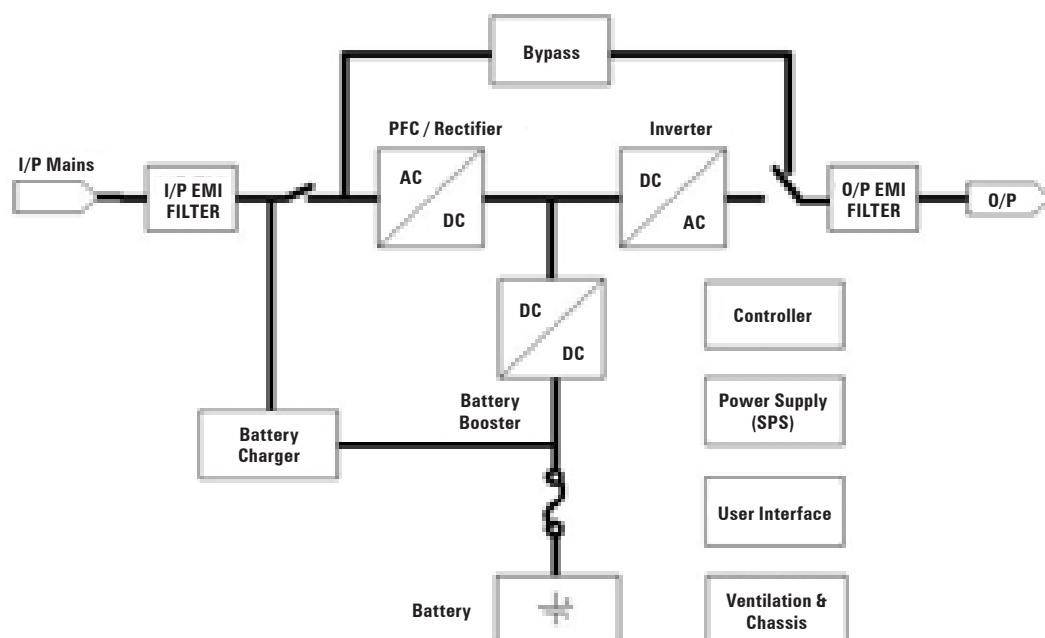
**Table 4.** LCD panel messages and their functions

## 3.2. DEFINITION AND STRUCTURE.

### 3.2.1. Nomenclature.



### 3.2.2. Structural diagram



**Fig. 18.** Block diagram

### 3.3. SYSTEM DESCRIPTION.

#### 3.3.1. Operating principle.

The UPS **SLC TWIN** series is a double conversion system AC/DC – DC/AC, with battery. This structure is the one that provides a higher reliability and protection to the output electrical power supply in small and medium UPS power rates.

The input AC voltage is converted to DC by means of a diodes rectifier of full wave. The rectifier output is connected to the input of the Power Factor Corrector (hereafter PFC).

The PFC boosts the DC voltage to optimal levels so the inverter converts that DC voltage into an AC sinewave voltage, which is stabilized in voltage and frequency, and ready to feed the loads. The batteries are connected to the PFC input through a thyristor of medium power, for those cases that their energy is needed (mains fault or energy with poor quality).

The battery charger takes the energy from the PFC output (for equipments with standard autonomy), and adapts it to the optimal levels of the battery bank to charge.

This double conversion structure is complemented with a bypass switch. The bypass switch is made by two relays, one for the bypass line and the second one (contactor depending on the power) for the inverter line, connects the output load with the bypass line directly in those special conditions like overloads, overtemperatures, etc. And they are connected to the inverter again when the normal conditions are restored.

### 3.4. OPTIONAL.

Depending on the chosen configuration, your equipment could include any of the following optional:

#### 3.4.1. Integration into IT networks through the SNMP adaptor (C16).

The big IT systems based on LANs and WANs that make up servers with different operating systems has to include the control and management help at the managing system disposal. This help is got through the SNMP adaptor, which is universal accepted by the main software and hardware manufacturers.

The available SNMP optional for **SLC TWIN** series is card type, in order to be inserted into the slot that UPS has in its rear side. Thanks to this format, it is avoided to have small devices around the UPS.

The connection from the UPS with the SNMP is internal, meanwhile the one from the SNMP to the IT network is done through a RJ45 10-base connector.

#### 3.4.2. AS400 card (C16).

The main target of the AS400 card is to transmit digital signals with no potential for any use depending on the application. The most common application of this kind of interface is the automatic closing file and the computer shutdown later on, including the UPS.

The signals provided by the card in dry contact format are:

- UPS fault (NO; normally open)
- General alarm (NC; normally closed)
- UPS on bypass (NC)
- Low battery alarm (NO)
- UPS on inverter (NO)
- Mains fault alarm (NO)

Besides there is an input to shutdown the equipment remotely.

#### 3.4.3. USB port card (C16).

The UPS **SLC TWIN** series has a USB port card as an option, which converts the traditional RS-232 port with DB9 format into a USB port (Universal Series Bus) type B.

This allows connecting the UPS with a personal computer (PC) easily. The format of the USB optional is card type. It allows being inserted into the slot that the UPS has available in its rear side.

#### 3.4.4. Protocolo MODBUS.

The big IT systems based on LANs and WANs, many times require that the communication with any element that is integrated inside the IT network is carried out by means of an industrial standard protocol.

One of the industrial standard protocols more used in the market is the MODBUS protocol. The **SLC TWIN** series is also ready to be integrated in this type of environments through the external **Win-power CMC card**, which is used for the interface to implement the remote/monitor function without the computer direct communicate to the UPS. Without install the WinPower software, you are not able to monitor/control the UPS through the LAN. Here is the connection for the CMC card. Owing to the connection is in series, once the cable is disconnected within the UPS connection, all the UPS after that connection will all lose the communication

## 4. INSTALLATION.

### 4.1. IMPORTANT SAFETY INSTRUCTIONS..



Read the following safety instructions before installing and starting up the equipment.

#### 4.1.1. Transport.

- Transport the UPS in the original packing (as protection from jolts and impacts).

#### 4.1.2. Localiton.

- Condensation problems could happen when moving the UPS from cold area to heat one. The UPS has to be perfectly dry before installing. Two hours of acclimatization should be allowed as minimum.
- Do not install the UPS close to water, wet or dust environments.
- Do not install the UPS in places exposed to direct sunlight or close to heat sources.
- Do not block the cooling wholes of the UPS enclosure.

#### 4.1.3. Take care of your safety.

##### • Equipment definition.

Movable installation, class I, fed by an outlet type A and distribution system TT (neutral regime is referred to earth).

Equipment with terminals: Fix installation, class I, permanent connected and TT distribution (neutral regime is referred to earth)

The UPS can be connected and handled by staff without any specific training, less those hardwired models that will be installed by qualified staff and in accordance with the regulations in force.

Do not forget that the UPS is a generator of electric energy, therefore the user has to take the needed cautions against direct and indirect contacts.

• Do not connect devices or loads at its outlets that can overload the UPS, like laser printers.

• Put the cables in order to avoid tripping or stepping with them.

• Do not overload the equipment with domestic loads like hairdryers, irons, etc...

• The earth connection must be wired to the protection earth labelled as , making sure that it is done before turning on the input voltage. For small devices (connected with power cord with plug), the user has to make sure that the outlet corresponds with the supplied type, with earth connection completely isolated and connected to the local protective earth.

• The UPS plug connected to the mains outlet, will have easy access and close to the equipment.

- In those models with terminals a disconnection device has to be installed, with easy access and close to the equipment.
- To connect the UPS to the mains and loads, use standardized cables and tested by an official organization only.
- When installing the equipment, make sure that the sum of the earth leakage currents at the UPS output plus the connected load/s do not overcome 3,5 mA.

#### 4.1.4. Operating.

- Do not disconnect the power cord plug of the UPS meanwhile the loads are turned on, because the earth connections of the equipment and loads will be disconnected.
- The UPS is characterized for having an internal current power supply (batteries). The UPS outlets can be alive electrically although the UPS is disconnected from the installation of the building physically.
- Pay special attention to the labelling of the equipment that warns on «Electrical discharge danger» and stated as .
- Inside the equipment there are dangerous voltages, do not open the case, the access has to be done by authorised and competent staff. In case of maintenance or fault, consult the closest STS (Service and Technical Support).
- To disconnect the UPS completely, first press the OFF button, then disconnect the power cord cable in those models with plug or turn Off the disconnection device close to the equipment (to be installed and property by the customer), in those models with terminals.
- Make sure that objects or fluids cannot enter inside the UPS.

#### 4.1.5. Maintenance, service and faults.

- The UPS works with dangerous voltages. The repair has to be done by qualified staff only.



Electrical shock risk. Although the unit is disconnected from the electrical mains, there are internal parts in the UPS that are still connected to the batteries, therefore they are both under voltage and dangerous.

- Before doing any service and/or maintenance, disconnect the batteries and check that there is not any voltage in the terminals capacitor bus (BUS-capacitors).

- Only properly staff familiarized with the batteries and with the additional caution measures can replace them and supervise the operations. Not authorized people should be kept away.



Electrocution risk. The battery circuit is not isolated from the input voltage. Dangerous voltages can exist between the battery and earth terminals. Before touching, check that there is not any voltage present.

- The batteries can cause electrocution and to produce a high short-circuit current. Take the caution measures stated below when working with batteries:

- Take watches, rings and any metallic object off.
- Use tools with insulated handles only and gloves.

- During battery replacement, install the same number and type.
- Do not catch fire to the batteries. Explosion danger.
- Do not open or destroy the batteries. Electrolyte spillage can hurt eyes and skin. It can be toxic.

- Replace the fuse by another one with the same size and type only, in order to avoid fire risks.
- Do not dismantle the UPS.

#### 4.2. TO KEEP IN MIND.

-  The UPS can be wired and handled by non-trained staff, less those models with terminals that will be installed by qualified staff and in accordance with the applicable safety regulations.

#### 4.3. UNPACKING AND CONTENT CHECKING.

1. Unpack and check the content:
  - One UPS.
  - Documentation relative to the equipment (user's manual and warranty certificate).
  - One power cord to connect it to the mains and standardized for 16A, less those hardwired models.
  - One serial communication cable.
  - One battery cable (Modules with extended autonomy only (B\*)).
  - One CD for monitoring software.
2. Inspect the UPS with the purpose of detecting possible damages due to the transport. Do not start up the unit and notify immediately to the carrier and to your distributor if there is any damaged or missing part.

#### 4.4. CONNECTION OF THE INPUT, OUTPUT AND PROTECTIVE EARTH WIRING.

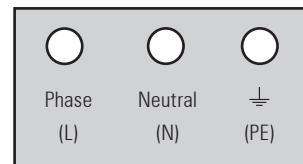
##### 4.4.1. Notes for installing.

1. The UPS has to be installed in a well-cooled place, far from water, inflammable gases and corrosive agents.
2. Make sure that the front and rear cooling wholes of the UPS are not blocked. Leave 0,2 metres of space around the UPS as minimum.
3. Drops of water condensation can appear if the UPS is unpacked in a low temperature environment. In this case it is necessary to wait until the total unit is dry before proceeding to the installation and the starting up. Otherwise electrocution danger will exist.
4. The installation and wiring have to be done in accordance with the local regulations and following the instructions of professional staff.
5. For safety, turn off the power supply before doing the installation.

6. It is recommended to charge the batteries of the UPS for 1-2 hours before its use. Once the input circuit breaker is turned «On», the UPS will charge the batteries automatically. The UPS can be used immediately without charging the batteries previously, but the expected autonomy will be lower than the standard value, being possible to be nil or almost nil.

##### 4.4.2. Installation.

1. Insert the end of the power cord supplied with the equipment (end with female connector IEC 320), into the connector (C0) of the UPS, make the suitable pressure to insert it correctly.
2. The power supply of the equipment has to be done through the supplied power cord (C1) and it has to be connected to an outlet (socket) with both earth connection and easy access. In case of requiring another power cord due to lose, ageing or damage of the original one, replace it by a standardized one with the same features.



**Fig. 19.** Output terminal (C4)

3. Connect the loads to the outlets (C4).
4. Some model depending on the power, has output terminals (C4) to feed the loads. To have access to them it is better to remove the screws that fix the terminal cover, take it away and next make the wiring connections by respecting the order of the phase (L), neutral (N) and protective earth (PE) stated in the labelling and figure 19. Finally put the terminal cover back by fixing it with the respective screws.  
The cross section of these cables will be taken from the nominal currents stated in the nameplate of the equipment, by respecting the Local an/or National Low Voltage Electrotechnical Regulation.

5.  Under request, the equipment can be supplied with different outlets (French, IEC, Schuko, UK, ...), which are standardized for 10A current (IEC) or 16A (for the rest). Do not overload the UPS and the outlets. The laser printers, plotters, scanners or other peripheral devices with high consumption **do not have to be** connected to the equipment.
6. When the installation is finished, make sure that the wiring is correct.
7. Install a circuit breaker at the UPS output if were needed.

Model	Power (VA)	Nr outlets	Output terminals
SLC-700-TWIN	700	2	-
SLC-1000-TWIN	1000	2	-
SLC-1500-TWIN	1500	3	-
SLC-2000-TWIN	2000	3	-
SLC-3000-TWIN	3000	3	-
SLC-700-TWIN B1	700	2	-
SLC-1000-TWIN B1	1000	2	-
SLC-1500-TWIN B1	1500	3	-
SLC-2000-TWIN B1	2000	3	-
SLC-3000-TWIN B1	3000	3	-
SLC-700-TWIN R	700	4	-
SLC-1000-TWIN R	1000	4	-
SLC-1500-TWIN R B0	1500	4	-
SLC-2000-TWIN R B0	2000	4	-
SLC-3000-TWIN R B0	3000	-	1 set (F+N)
SLC-700-TWIN R B1	700	4	-
SLC-1000-TWIN R B1	1000	4	-
SLC-1500-TWIN R B1	1500	-	1 set (F+N)
SLC-2000-TWIN R B1	2000	-	1 set (F+N)
SLC-3000-TWIN R B1	3000	-	1 set (F+N)

**Table 5.** Number of outlets and terminals depending on the model

8. Never mind if the UPS is connected to any load, voltage could exist at its output. The internal parts of the equipment can remain with voltage although the UPS is shutdown. Make sure that there is no output voltage, disconnect the UPS and turn off the input power supply in the electrical panel.
9. In case, it is needed to connect inductive loads to like laser printers, the inrush current of such loads should be calculated, in order to determine if the UPS power rate is enough to supply them.

#### 4.4.3. Procedure to connect the models with external batteries, extended autonomies.

1. Do not make any connection between the UPS and battery modules, when the equipment and/or loads are turned on.
2. The DC nominal voltage of the external battery pack is 36 V DC (3 batteries of 12 V) for 0,7 kVA and 1 kVA equipments, and 96 V DC (8 batteries of 12 V) from 1,5 to 3 kVA equipments. To achieve a higher autonomy, it is possible to connect some battery packs.

 Before connecting the battery modules to each other and/or UPS, check that they have the same voltage and capacity, otherwise the difference of potential will provoke a short-circuit, which will cause damages to the UPS and/or to the battery modules.

3. Any connection between the UPS and battery module/s will be done taking care on the stated polarity in the equipment labelling and the colour of the cables (red for positive, black for negative and green yellow for the earth cable).
4. The connection with the batteries, either because they are

supplied separate from the equipment or due to UPS extended autonomy, will be done through the connector (C2) of the equipment and (C2b) of the own battery module. Each battery module has two identical connectors duly polarised too. One of them is for the UPS connection and the other one is for the connection with another battery module.

5. Insert one end of the cable into the connector (C2) of the UPS and the other end of the cable into the connector (C2b) of the battery module. It is possible to link some battery modules by means of the two connectors that each external battery unit has, so one connector has to be connected to the preceded module and the other one to next.

## 4.5. COMMUNICATION PORTS..

### 4.5.1. RS-232 interface (C7).

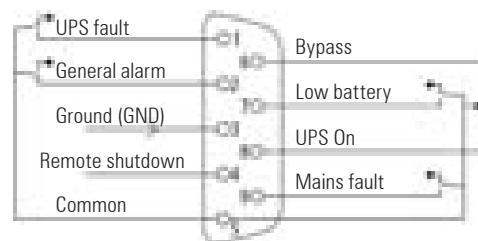
Pin #	Description	Input/Output
2	TXD	Output
3	RXR	Input
5	GND	Input

**Table 6.** Pin-out of DB-9 connector (C7) RS232 interface

### 4.5.2. AS400 interface (C16) (Option).

Less the above communication protocol, this UPS series has an AS400 communication protocol (optional). Contact with the distributor for more details.

Pin-out and DB-9 connector description (C16) of the AS400 card.



**Fig. 20.** DB-9 connector (C16), AS400 interface

Pin #	Description	I/O	Pin #	Description	I/O
1	UPS fault	Output	6	Bypass	Output
2	General alarm	Output	7	Low battery	Output
3	GND	Input	8	UPS ON	Output
4	Remote shutdown	Input	9	Mains fault	Output
5	Common	Input			

**Table 7.** Pin-out of DB-9 connector (C16), AS400 interface

#### **4.6. OVERVOLTAGE PROTECTION (FAX, MODEM, ...), CONNECTORS RJ-45 (C11) AND (C12) FOR ETHERNET NETWORK.**

- This connection is not necessary to make for UPS operating, and it is only used for transient voltage protection.
- Connect the input line (server side) of the communication network to the «Input» connector (C11).
- Connect the output line (user side) to the communication network to the «Output» connector (C12).

**i** The ETHERNET network, could not operate if it is connected wrongly.

#### **4.7. SOFTWARE.**

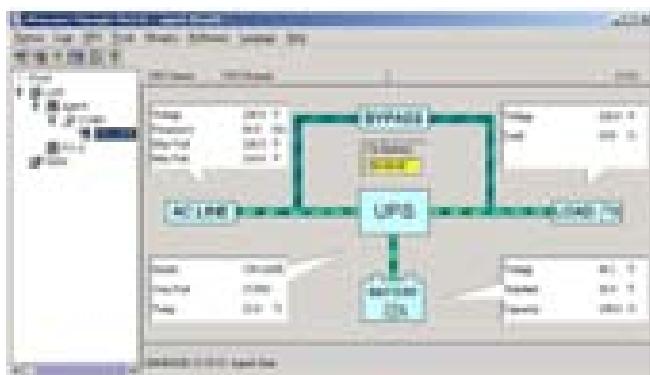
##### **Free software - WinPower.**

WinPower is the brand of the new UPS monitoring software, which facilitates a friendly monitoring and control interface. In case of mains failure, this software gives an automatic Shutdown for a system made by several PCs. With this software, the users can monitor and control any UPS in the same Local Area Network LAN without taking care about the distance among them.

##### **Installation procedure:**

1. Insert the supplied CD. The installation assistance will boot automatically. Follow the steps stated by itself.
2. When it is asked, enter the serial number written over the CD.

When the PC reboots, the WinPower software will be showed as a plug icon with green colour in the system tray, near to the clock.



**Fig. 21.** Graphic screen of WinPower software

## 5. OPERATING.

### 5.1. OPERATING MODE.

#### 5.1.1. Starting up the UPS with mains voltage (on Line mode).

1. Check both all the connections have been done properly and the input circuit breaker (M1), is not turned off. This protection for SLC-3000 TWIN R is replaced by a circuit breaker, turn «On» and also this model has an output fuse (M4), check that is fitted in and in good conditions.
2. Turn «On» the distribution panel switch. The UPS could not supply power supply to the loads because the bypass mode is deactivated, code «00».
3. Start up the inverter of the UPS by pressing the button «On» of the front panel for more than 1 second. The system will do an autotest and once finished the inverter will start up and also the UPS status will be displayed in the front LCD panel.

**Note:** By default the equipment is set from factory with the bypass mode disabled, code «00», so the loads will not be supplied although there is voltage at the UPS input. To modify this factory setting, go to section 5.2.6 and activate the code «01».

#### 5.1.2. Starting up the UPS without mains voltage (on Battery mode).

1. Start up the inverter of the UPS by pressing the button «On» of the front panel for more than 1 second. The system will do an autotest and once finished the inverter will start up and also the UPS status will be displayed in the front LCD panel. The period time that the UPS will remain started up will depend on the battery charging level and the loads connected at the UPS output.

#### 5.1.3. UPS shutdown with mains voltage (on Inverter mode).

1. Shutdown the inverter of the UPS by pressing the button «Off» in the front panel for more than 1 second. The UPS will go to no output mode «00» -bypass disabled- (code 00) or on bypass mode (code 01), depending if the initial setting has been modified or not. On bypass mode (code «01») the equipment will still be supplying output voltage through the bypass, so the input circuit breaker of the switchgear panel has to be turned off to shutdown the loads completely.

#### 5.1.4. UPS shutdown without mains voltage (on Battery mode).

1. To shutdown the inverter of the UPS, just press the button «Off» of the front panel for more than 1 second. The UPS will be turned off.

#### 5.1.5. Battery test function.

- To make a battery test with the equipment started up, press the button «I» of the front panel or disconnect the input power supply to the UPS.

#### 5.1.6. Alarm silencer.

- To silent the alarm manually with the equipment on battery mode, press the button «I» of the front panel.  
The alarm will automatically be activated when the battery capacity is low (end of autonomy). When this happens, the loads have to be turned off and the UPS shutdown, because the equipment will break the output voltage in short.

## 5.2. CONTROL PANEL.

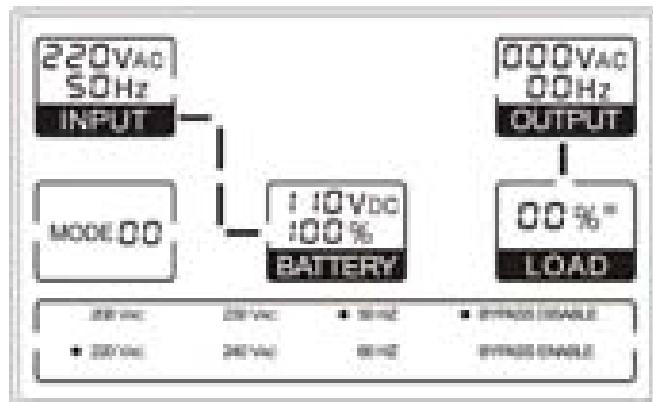
The different codes of operating, fault or warning can be displayed in the LCD panel of the synoptic, are described in the table 8. Some codes can be displayed or activated at any time, corresponding to modes of operating, warning or fault alarm or even though some alarms of fault together. Each one of these codes will be displayed in the screen of the display cyclically, less when one or more alarms are activated. In the last case, the display will only show the alarm or the alarms cyclically, not being displayed the operating and warning modes.

Operating mode	Code	Operating mode	Code
<b>Operating code</b>			
No output mode	00	Battery mode	03
Bypass mode	01	Battery test mode	04
Line mode	02		
<b>Fault codes</b>			
Bus fault	05	Overload fault	07
Inverter fault	06	Overtemperature fault	08
<b>Warning codes</b>			
Wiring error	09	Low battery	12
Fan or fans fault	10	Charger fault	13
Battery overvoltage	11		

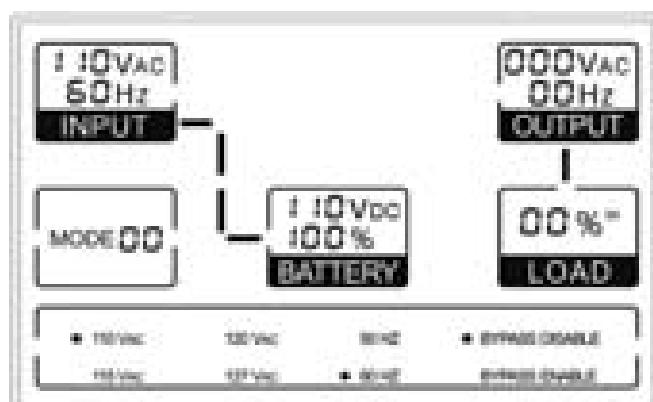
**Table 8.** Code list and their meaning

### 5.2.1. No output mode, code «00».

The LCD panel on no output mode is showed in figures 23 and 24. The available information in the LCD panel is input, battery, UPS output and load. The operating mode code of the UPS is «00». The UPS has no output on this mode, but it charges the batteries.



**Fig. 22.** Operating mode screen, no output mode code «00». 220Vac equipments.



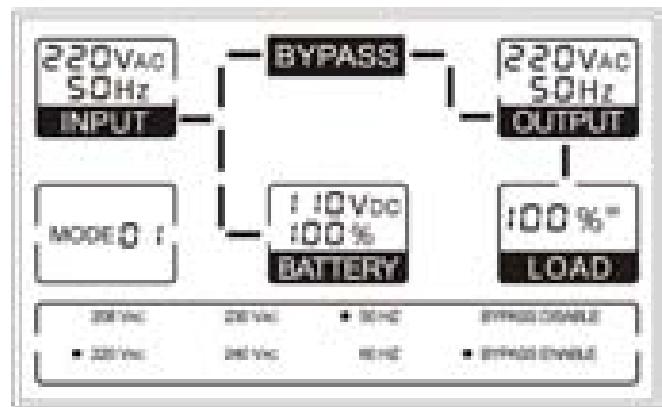
**Fig. 23.** Operating mode screen, no output mode code «00». 110Vac equipments.

### 5.2.2. Bypass mode, code «01».

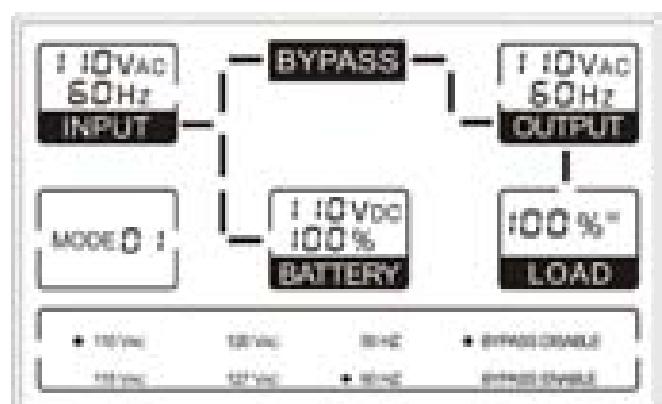
The LCD panel on Bypass mode is showed in figures 25 and 26. The available information in the LCD panel is input, battery, UPS output and load. The operating mode code of the UPS is «01». In the same figure the «BYPASS» block (square with the BYPASS label) is active, it means that the bypass supplies the power used by the load or loads through the internal filter and it charges the batteries too.

The acoustic alarm of the UPS will beep once every 2 minutes.

The UPS doesn't have available the autonomy function when it runs on Bypass mode, so if the mains faults the loads will be shutdown.



**Fig. 24.** Operating mode screen, Bypass mode code «01». 220Vac equipments.



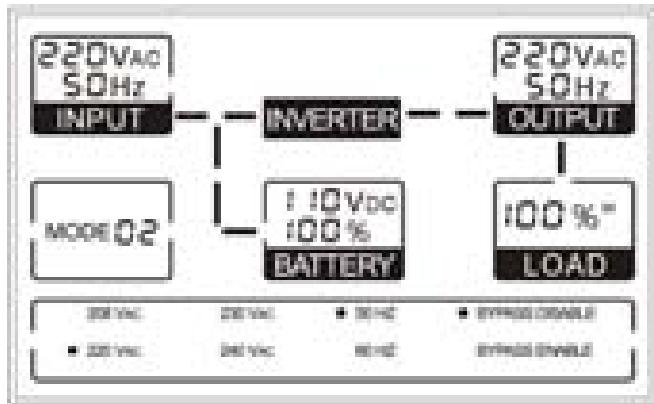
**Fig. 25.** Operating mode screen, Bypass mode code «01». 110Vac equipments.

### 5.2.3. Line mode.

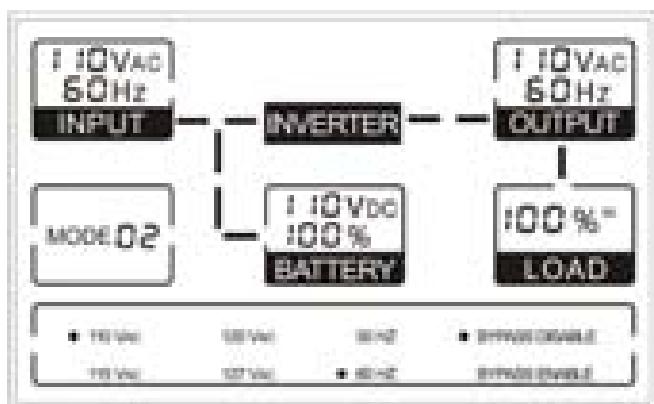
The LCD panel on Line mode is showed in figures 27 and 28. The available information in the LCD panel is input, battery, UPS output and load. The operating mode code of the UPS is «02».

In the same figure the «INVERTER» block (square with the INVERTER label) is active, it means that the inverter supplies the power used by the load or loads and it charges the batteries too.

If the output is overloaded, the load percentage is displayed and the acoustic alarm will beep twice per second. It is better to disconnect, one by one, those loads that are not critical in order to decrease the load percentage under 90% of the UPS nominal power rate.



**Fig. 26.** Operating mode screen, Line mode code «02». 220Vac equipments.



**Fig. 27.** Operating mode screen, Line mode code «02». 110Vac equipments.

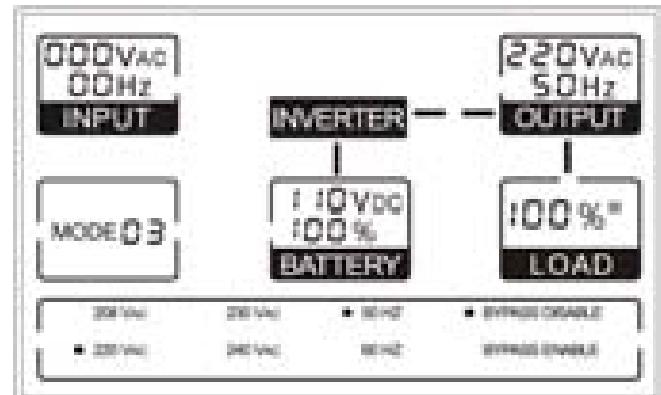
#### 5.2.4. Battery mode / Battery test mode.

The LCD panel on Battery mode is showed in figure 29. The available information in the LCD panel is input, battery, UPS output and load. The operating code of the UPS is «03».

In the same figure the «INVERTER» block (square with the INVERTER label) is active, it means that the inverter supplies the power used by the load or loads, but it doesn't charge the batteries because the mains is not present or bad.

- When the UPS is operating on Battery mode, the acoustic alarm beeps once every 4 seconds. If the button «I» of the front panel is pressed for more than 1 second, the alarm will stop. Press the button «I» for more than 1 second again to reactivate the acoustic alarm function.
- If the UPS runs on Battery mode and the input voltage mains overcomes the specific range of the equipment, the «H» symbol will be displayed as an alarm mode. Meanwhile, if the input voltage mains is lower than the specific range of the equipment, the «L» alarm will be displayed. If there is not input mains, there will not be any symbol and both the voltage and frequency will be displayed as zero.

The same figure 29 shows the battery test mode and the «H» and «L» symbols will be displayed during the test, if the input voltage overcomes or it is lower than the specific ranges of the equipment. The operating mode code of the UPS is «03» on battery mode, and «04» on battery test mode..



**Fig. 28.** Operating mode screen, Battery mode code «03». 220Vac equipments.

#### 5.2.5. Fault mode.

Anyone of the fault or warning codes showed in the table 8 are considered as fault mode. Besides, some warning word can also be displayed in the LCD panel like for example «SHORT», which means that the equipment or load is in short circuit and therefore the UPS is on inverter fault mode. See table 4 of chapter 3.

#### 5.2.6. Settings through the LCD panel.

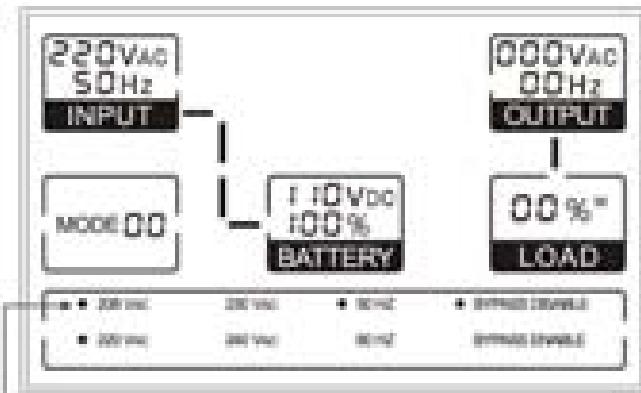
The output voltage range, output frequency and bypass status can be set directly through the LCD panel of the UPS. The output voltage range can be selected among 208V, 220V, 230V and 240V. The output frequency range can be set to 50Hz or 60Hz. The Bypass can be enabled or disabled. Nevertheless, the settings can only be done with the UPS on bypass or No output modes.

On Bypass or No output mode, press the button «» (Select) of the LCD panel for more than one second and the black point will blink close to the «208V» indication of the LCD panel. If we press the button «» (Select) again, the black point will move through the rest of values: «220V», «230V», «240V», «50Hz», «60Hz», «Bypass disable», «Bypass enable». When pressing the button «» (Enter) for more than 1 second, the black point will not blink and the voltage range or output frequency or Bypass status will be modified by the selected value. In case the button «» (Enter) or button «» (Select) are not pressed in 10 seconds period, the black point will disappear without applying any changes.

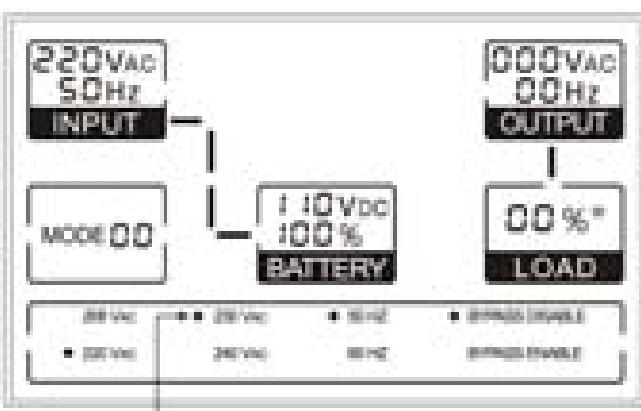
Only one voltage or frequency value can be selected at the same time. The values will be changed once the UPS is started up through the button «I».

The UPS will transfer to bypass mode for a few seconds when «Bypass enable» is selected, and to no output mode when «Bypass disable» is selected.

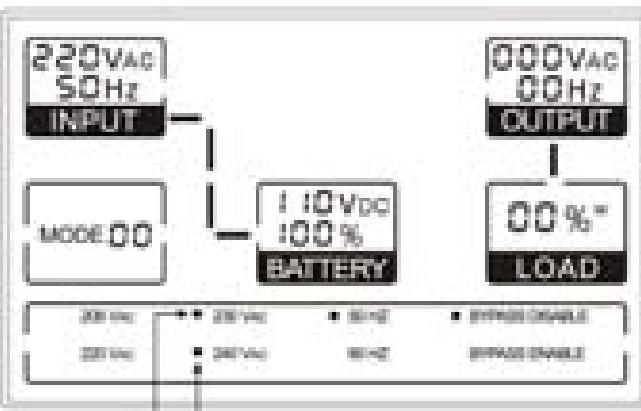
Example to change the output voltage from 220V to 230V through the LCD panel:



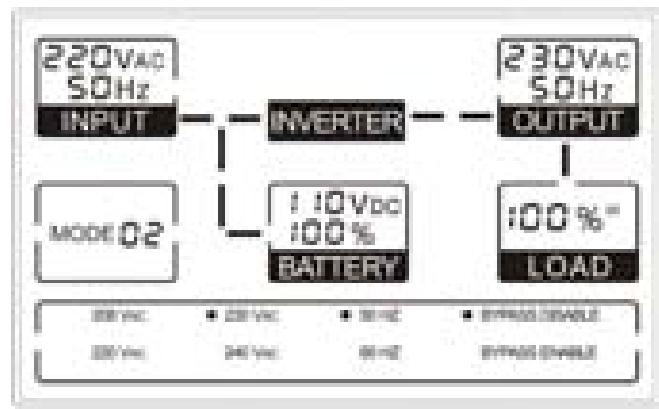
**Step 1:** A blinking black point is displayed beside «208Vac» after pressing the button «» (Select) of the LCD panel.



**Step 2:** The blinking black point is displayed beside 230 V after pressing twice the button «» (Select).



**Step 3:** When pressing the button «» (Enter) for more than 1 second, the new selected value is validated.



**Step 4:** The output voltage is set to 230 V after starting up the UPS.

**Fig. 29.** Steps 1 to 4: Examples of how to modify the equipment parameters.

## 6. MAINTENANCE, WARRANTY AND SERVICE.

### 6.1. BATTERY MAINTENANCE.

- This UPS series only requires a minimum maintenance. The battery used in the standard models is lead acid, sealed, valve regulated and maintenance free. These models require a minimum of repairs only. The only requirement is to charge the UPS regularly to prolong the expected battery lifetime. Meanwhile it is connected to the mains power supply, never mind if the UPS is turned on or not, it will keep the batteries charged and will also give a protection against overcharging and over discharging.
- The UPS has to be charged every 3 months, if it is not used for long time.
- In hot areas, the battery should be charged and discharged every 2 months. The standard charging period should be 5 hours to 90% of the charge batteries.
- Under normal conditions, the battery lifetime is from 3 to 5 years at 25°C ambient temperature. In such case that the battery were not in good conditions, it should be replaced before. The replacing has to be done by qualified staff.
- Always replace them with the same number and type.
- Do not replace one battery only. All the batteries have to be replaced together and according to the manufacturer's instructions.
- Usually, the batteries have to be charged and discharged every 3 months. The charging should start when the UPS would have shutdown due to a deep battery discharge. The charge time for a standard UPS should be 5 hours to 90% of the charge batteries.

### 6.2. NOTES FOR INSTALLING AND REPLACING THE BATTERY.

1. Before installing the batteries, take rings, watches and bracelets off.
2. If it were needed to replace the connection of any cable, ask for original parts to authorised distributors or service centres in order to avoid overheating or sparks with fire danger due to an inadequate size.
3. Do not throw the batteries to fire, explosion danger exists.
4. Do not open the batteries; the electrolyte spillage is very toxic and harmful for the skin and eyes.
5. Do not short-circuit the + and - poles of the batteries, electrocution or fire danger exists.
6. Make sure that there is not any voltage before handling the batteries. The battery circuit is not isolated from the input circuit. There could be dangerous voltages between the battery and earth terminals.
7. Although the input circuit breaker is turned off, internal parts of the UPS are still connected to the batteries, therefore dangerous voltage exists. So, before doing any repair or maintenance job, turn off the battery circuit breaker or remove the connection between battery blocks.

8. The batteries have dangerous voltages. The maintenance or replacement of the batteries has to be done by qualified staff, which should be familiarized with them. No other person should handle them.

### 6.3. TROUBLESHOOTING GUIDE.

Problem	Possible cause	Solution
With the UPS connected to mains, the equipment seems not be connected to it	There is no input voltage	With a measurement instrument check that the input voltage is available and all the cables of the UPS and loads are connected properly.
The warning code 09 is displayed	The phase and neutral are swapped	Take out the plug from wall socket, rotate it 180° and insert it again.
The warning code is 03 and the symbols "H" or "L" can be displayed	The voltage and/or frequency of the mains are out of range	Check the voltage and frequency values of the input. If they are out from range for long period times, inform your distributor energy company.
Although the displayed code is 00 or 01, the UPS is ready to feed the loads	The inverter is not started up	Press for more than 1 second the key "I".
The warning code is 03 and the acoustic alarm beeps every 4 seconds	Fault in the power supply to the UPS.	The loads are supplied from UPS batteries. When the alarm frequency is accelerated, 1 beep per second, the end of autonomy is close to. The power supply to the loads will broken in short. It is recommended to shutdown them.
The warning code is 07 and the acoustic alarm beeps every second	Overload	Reduce the number of loads connected to the UPS output.
The warning code is 08 or 06 or 08 with a continuous acoustic alarm	Fault in the power supply to the UPS	Contact with the nearest distributor or Service and Technical Support (STS) center.
The autonomy time is less and less.	Battery has not been fully charged	Charge the batteries between 1 and 2 hours. If the problem persists contact with the nearest distributor or STS.
	UPS overloaded	Reduce the number of loads connected to the UPS output.
The warning code is 13 with an acoustic alarm every second	Aged battery	Replace the batteries. Contact with the nearest distributor or STS.
	Battery charger faulty	Contact with the nearest distributor or Service and Technical Support (STS) center
The warning code is 10	The fan/s are blocked or do not work	Check the fan/s and inform the nearest distributor or Service and Technical Support (STS) center.

**Table 9.** Fault location for tower format.

In case were needed to contact with the assistance service, provide the following information:

- Model and serial number of the UPS.
- Date of the problem.

- Complete description of the problem, including the LCD panel, code, alarm, output power condition and load capacity. If the UPS is a model with extended autonomy, the external battery pack has to be informed as well.

#### 6.4. WARRANTY CONDITIONS.

The limited warranty provided by **SALICRU, S.A.** only applies to those products that you acquire for commercial or industrial use in the normal development of your business.

##### 6.4.1. Covered product.

UNINTERRUPTIBLE POWER SUPPLY, **SLC TWIN** model.

##### 6.4.2. Warranty terms.

**SALICRU** guarantees this product against any parts and/or labour defect for 24 months period from its commissioning by **SALICRU** staff or other specifically authorised. In case of failure of the product inside the warranty period, **SALICRU** must repair, at your facilities at no cost, the faulty part or parts. The transport expenses and packaging will be borne to the user.

**SALICRU** guarantees for period time not lower than 10 years, the availability of parts and spare parts, as hardware as software, as well as a complete assistance regarding the repairs, components replacement and software updating.

##### 6.4.3. Out of scope of supply.

**SALICRU** is not forced by the warranty if it appreciates that the defect in the product doesn't exist or it was caused by a wrong use, negligence, installation and/or inadequate testing, tentative of repairing or not authorized modification, or any other cause beyond the foreseen use, or by accident, fire, lightning or other dangers. Neither it will cover, in any case, compensations for damages or injurie.

#### 6.5. DESCRIPTION OF THE AVAILABLE MAINTENANCE CONTRACTS AND SERVICE.

When the warranty is expired, **SALICRU**, adapting to the customer's needs, has several maintenance modalities

- **Preventive.**

It guarantees a higher safety to preserve the correct operating of the equipments with a yearly Preventive visit, in which the specialised technicians of **SALICRU** make several tests and sets in the systems:

- Check and write down the input and output voltages and currents per phase.
- Check the readings of the LCD panel.
- Other measurements.
- Check the fan status.

- Check the load level.
- Check the correct location of the equipment.
- General cleaning of the equipment.

This way, it is guaranteed the perfect operating and the possible coming faults are avoided.

These supervisions are usually done without shutdown the equipment. In those cases that a shutdown were needed, a date and time would agree with the customer to do the task.

This maintenance modality covers, inside the working timetable, all the journey expenses and manpower.

- **Corrective.**

When a fault occurs in the equipment operating, and previous notice to our Service and Technical Support (STS), in which a specialized technician will establish the failure scope and he will determine a first diagnostic, the corrective action starts.

The needed visits for its correct resolution are unlimited and they are included inside the maintenance modalities. It means that **SALICRU**, in case of failure, will check the equipments as many time as it were needed.

Besides, inside these two modalities, is possible to fix the **action timetable and response times** in order to be adapted to the customer's needs:

- LV8HLS.** Customer's attention from Monday to Friday from 9 h. to 18 h. The response time is inside the same day or, as maximum, in the next 24 hours of the fault notification.
- LV8HLS.** Customer's attention from Monday to Saturday from 6 h. to 20 h. Response time is inside the same day or, as maximum, at first time of the next working day.
- LV8HLS.** Customer's attention from Monday to Sunday 24 h., 365 days per year. Response time in less than two or three hours after the fault notification

- **Additional arrangement: 1-m-cb.**

- Index 1.** It means the number of Preventive visits per year. It includes journey and manpower expenses inside the established timetable for each maintenance modality, as well as all the needed Correctives visits. Excluding all the parts and batteries in case of reparation.

- Index m.** It means to include all the parts.

#### 6.5. TECHNICAL SERVICE NETWORK.

Coverage, both nationally and internationally, in points and Technical Support Services (**S.T.S**), consists of:

##### National level:

Andorra, Barcelona, Madrid, Bilbao, Gijón, A Coruña, Las Palmas de G. Canaria, Málaga, Murcia, Palma de Mallorca, San Sebastián, Santa Cruz de Tenerife, Sevilla, Taco (La Laguna - Tenerife), Valencia y Zaragoza.

##### International level:

French, Brazil, Hungry, Portugal, Singapore, U.K., China, Mexico, Uruguay, Chile, Venezuela, Colombia, Argentina, Polonium, Philippines, Malaysia, Pakistan, Morocco, Thailand, Emirates Arabs Unis, Egypt, Australia and New Zealand.

## 7. ANNEXES.

### 7.1. TECHNICAL SPECIFICATIONS.

MODEL	SLC-700-TWIN	SLC-1000-TWIN	SLC-1500-TWIN	SLC-2000-TWIN	SLC-3000-TWIN
<b>RECTIFIER</b>					
Technology	Diodes + DC/DC "Boost"				
Nominal voltage	AC single phase (P+N) - 110 / 115 / 120 / 127 / 208 / 220 / 230 / 240 V (according to model)				
Input voltage range	176 ÷ 276 V (equipments to 230Vac); 60 ÷ 138 V (equipments to 110Vac)				
Frequency	50 / 60 Hz ± 4 Hz (tower format) / 50 a 60 Hz selectable (19" rack format)				
Efficiency	> 85%				88%
Power factor	≥ 0,95				
<b>INVERTER</b>					
Technology	PWM				
Switching frequency	19,2 kHz				
Power (kVA/kW)	0,7 / 0,49	1 / 0,7	1,5 / 1,05	2 / 1,4	3 / 2,1
Nominal voltage	AC single phase (P+N) - 110 / 115 / 120 / 127 / 208 / 220 / 230 / 240 V (according to model)				
Accuracy	± 2% (steady state) / < 6% (dynamic state)				
Frequency	50 / 60 Hz synchronized ± 4Hz / Free running ± 0,2 Hz				
Maximum slew rate	± 1 Hz/s				
Wave shape	Sinewave				
THDv with linear load	< 3%				
THDv with non-linear load	≤ 6% (in accordance with EN 62040-3)				
Dynamic response time	150 ms				
Overload on line mode	150% for 30 s. / > 150% for 0.3 s.				
Overload on battery mode	150% for 30 s. / > 150% for 0.3 s.				
Permissible crest factor	3 to 1				
Permissible power factor	0,7				
<b>STATIC BYPASS</b>					
Type	To relays				
Nominal voltage	AC single phase (P+N) - 110 / 115 / 120 / 127 / 208 / 220 / 230 / 240 V (according to model)				
Nominal frequency	50 or 60 Hz ± 4%				
Overload	105 ÷ 130% alarm only; protections can trip > 130% for 1 s., then the output trips				
<b>INTERNAL CHARGER</b>					
Technology	AC/DC "Flyback"				
Charge type	P/U (constant power / constant voltage)				
Floating voltage accuracy	± 1 V				
Maximum charging current	1 A				
Standard recharging time	5 hours at 90%				
Autonomy at 50% load	> 10 minutes				
Number of batteries	3		8		
Voltage per block	12 V				
Voltage per string	36 V		96 V		
Capacity	7,2 Ah				
<b>EXTENDED CHARGER</b>					
Technology	DC/DC "Boost-Buck"				
Charge type	P/U (constant power / constant voltage)				
Floating voltage accuracy	± 1 V				
Maximum charging current	6,5 A				
Recharging time	Depend on the battery capacity				

MODEL	SLC-700-TWIN	SLC-1000-TWIN	SLC-1500-TWIN	SLC-2000-TWIN	SLC-3000-TWIN			
<b>BATTERIES</b>								
Type	AGM sealed, 3-5 years							
Quantity	3, 7Ah		8, 7Ah					
<b>GENERALS</b>								
Type	On-line double conversion							
Communication ports	RS-232 + AS400 (option)							
Software	WinPower							
Noise level at 1m.	< 55 dB		50 dB					
Operating temperature	0°C ÷ +40°C							
Storage temperature	- 20°C ÷ +70°C, without batteries							
Relative humidity	To 95%, non-condensing							
Operating altitude	1000 m.a.s.l.							
Protection degree	IP20							
Dimensions (D x W x H) Tower	410 x 145 x 220 mm.		470 x 195 x 347 mm.					
Rack 19"	450 x 483 x 2U		450 x 483 x 2U (x2)					
Weight	Tower	13 Kg. / 6 Kg. (B1)	14 Kg. / 7 Kg. (B1)	30 Kg. / 14 Kg. (B1)	31 Kg. / 15 Kg. (B1)	32 Kg. / 16 Kg. (B1)		
Rack 19"		16 Kg. / 8 Kg. (B1)	17 Kg. / 9 Kg. (B1)	10+28 Kg. / 10 Kg. (B1)	11+28 Kg. / 11 Kg. (B1)	12+28 Kg. / 12 Kg. (B1)		
Safety	IEC/EN 62040-1-1 (220V equipments); UL1778 (110V equipments)							
Electromagnetic compatibility (EMC)	IEC/EN62040-2, Category C1 (220V equipments); FCC PART 15 Class B (110V equipments)							
Operating	EN 62040-3							
Quality system	ISO 9001 and ISO 14001 TÜV							

**Table 10.** Technical specifications table

 If the UPS is installed in an altitude higher than 1000 metres, the output power rate will be derated according to the following table:

Altitude (m)	1000	1500	2000	2500	3000	3500	4000	4500	5000
Max. power (%)	100	95	91	86	82	78	74	70	67

**Table 11.** Output power derate according to the operating altitude.

## 7.2. GLOSSARY.

<b>•AC</b>	It is nominated as alternating current (CA in Spanish abbreviation and AC in English) to the electrical current in which the magnitude and direction varies in a cyclic way. The most common wave shape of the alternating current is sinewave, because the energy transmission is better. Nevertheless, some applications could need other period wave shapes, like triangular or square.	<b>•DC and AC</b>	The direct current (CC in Spanish, DC in English) is the continuous electron flow through a cable between two points with different potential. Unlike the alternating current (CA in Spanish, AC in English), in direct current the electrical charge always flow in the same direction from the highest potential point to the lowest one. Although, usually the direct current is identified with the constant current (for example the one supplied by the battery), it is direct current any current that always maintain its polarity.
<b>•Boost</b>	Direct converter of DC that supplies an output voltage higher than its input.	<b>•EMI filter</b>	Filter, which is able to reduce the electromagnetic interference considerably. EMI is the perturbation that occurs in a radio transmission or any other electrical circuit caused by an electromagnetic perturbation coming from an external
<b>•Bypass</b>	Manual or automatic, it is the physical junction between the input and the output of an electrical device.		

source. Also it is known as EMI due to its English acronym (ElectroMagnetic Interference), Radio Frequency Interference or RFI. This perturbation can break, damage or limit the efficiency of the circuit.

• IGBT

The Insulated Gate Bipolar Transistor is a semiconductor device that is used as a controlled switch in power electronic circuits. This device has the feature of the gate signal of the field effect transistors with the capacity of high current and low voltage saturation of the bipolar transistor, combining an isolated FET gate for the input and control and a bipolar transistor as a switch in a single device. The triggering circuit of the IGBT is as the MOSFET one, while the driving features are like the BJT.

- Interface

In electronic, telecommunications and hardware, an interface (electronic) is the port (physical circuit) through which are sent or received signals from a system or subsystems toward others

- Inverter

An inverter, is a circuit used to convert direct current into alternating current. The function of an inverter is to change an input voltage of direct current into a symmetrical output voltage of alternating current, with the required magnitude and frequency by the user or the designer.

• kVA

The voltampere is the unit of the apparent power in electrical current. In direct current is almost equal to the real power but in alternating current can defer depending on the power factor.

- LCD

LCD acronym of Liquid Crystal Display, device invented by Jack Janning, who was employee of NCR. It is an electrical system of data presentation based on 2 transparent conductor layers and in the middle a special crystal liquid that have the capacity to orientate the light when trespassing.

- LED

LED acronym of Light Emitting Diode, is a semiconductor device (diode) that emits light almost monochrome with a very narrow spectrum, it means, when it is direct polarized and it is crossed by an electric current. The colour, (wave longitude), depends on the semiconductor material used in its manufacturing, being able to vary from the ultraviolet one, going through the visible spectrum light, to the infrared, receiving these last ones the denomination of IRED (Infrared Red Emitting Diode).

- **Circuit breaker** A circuit breaker or switch, is a device able to break the electrical current of a circuit when it overcomes the maximum set values.

- **Off-Line mode** Regarding to an equipment, it is Off-line when it is disconnected from the system, it is out of service, and usually has its power supply turned off, so it means that is shutdown.

- On-Line mode

Regarding to an equipment, it is on line when it is connected to the system, and it is in operation, and usually has its power supply turned on.

- Rectifier

In electronic, a rectifier is the element or circuit that allows to convert the alternating current into direct current. This is done by rectifier diodes, which can be solid state semiconductors, vacuum or gassy valves like the mercury vapour. Depending on the features of the alternating current power supply used, it is classified as single phase, when they are fed by a single phase electrical mains, or three phase when they are fed by the three phases. Depending on the rectification type, they can be half wave, when only one of the current semi-cycles is used, or full wave, where both semi-cycles are used.

- Relay

The relay (in French relais, relief) is an electro-mechanical device that works as a switch controlled by an electric circuit where, through an electromagnet, a set of contacts is moved and it allows to open or to close other independent electric circuits.

- THD

It is the acronym of Total Harmonic Distortion. The harmonic distortion takes place when the output signal of a system is not equal to the signal that goes in. This nonlinearity affects to the wave shape, because the equipment has re-injected harmonics that are not in the input signal. Since they are harmonic, multiples of the input signal, this distortion is not so dissonant and it is less easy to detect.

**NOTES:** \_\_\_\_\_

**NOTES:** \_\_\_\_\_

**NOTES:** \_\_\_\_\_





**Avda. de la Serra, 100  
08460 Palautordera  
BARCELONA  
Tel. +34 93 848 24 00  
902 48 24 00  
Fax. +34 94 848 11 51  
[comercial@salicru.com](mailto:comercial@salicru.com)  
Tel. (S.T.S.) 902 48 24 01  
Fax. (S.T.S.) +34 848 22 05  
[sst@salicru.com](mailto:sst@salicru.com)  
**SALICRU.COM****

#### **BRANCHES AND SERVICES and TECHNICAL SUPPORT (S.T.S....)**

MADRID	PALMA DE MALLORCA
BARCELONA	PAMPLONA
BADAJOZ	SAN SEBASTIAN
BILBAO	SANTA CRUZ DE TENERIFE
GIJÓN	SEVILLA
LA CORUÑA	VALENCIA
LAS PALMAS DE G. CANARIA	VALLADOLID
MÁLAGA	ZARAGOZA
MURCIA	

#### **SUBSIDIARIES**

FRANCIA	RUSIA
PORTUGAL	CHINA
HUNGRIA	SINGAPUR
REINO UNIDO	MÉXICO
POLONIA	URUGUAY

#### **REST of WORLD**

ALEMANIA	ECUADOR
BÉLGICA	PERÚ
DINAMARCA	ARABIA SAUDÍ
GRECIA	ARGELIA
HOLANDA	EGIPTO
IRLANDA	JORDANIA
NORUEGA	KUWAIT
REPÚBLICA CHECA	MARRUECOS
SUECIA	TÚNEZ
SUIZA	KAZAJSTÁN
UCRANIA	PAKISTÁN
ARGENTINA	FILIPINAS
BRASIL	INDONESIA
CHILE	MALASIA
COLOMBIA	TAILANDIA

#### **Product Range**

Uninterruptible Power Supply UPS  
Voltage Stabilizers and Power Line Conditioners  
Switch Mode Power Supplies  
Industrial Power Supplies  
Lighting Flow Dimmer-Stabilizers  
Static Inverters  
Continuous Regulation Autotransformers



## UNINTERRUPTIBLE POWER SUPPLY



**UPS SLC TWIN series  
from 4 to 20kVA**



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## 1. INTRODUCTION.

### 1.1. GRATEFULNESS LETTER.

We would like to thank you in advance for the trust you have placed in us by purchasing this product. Read this instruction manual carefully before starting up the equipment and keep it for any possible future consult that can arise.

We remain at your entire disposal for any further information or any query you should wish to make.

Yours sincerely..

SALICRU

- The equipment here described can cause important physical damages due to wrong handling. Due to this, the installation, maintenance and/or fixing of the here described equipment must be done by SALICRU staff or specifically authorised.
- According to our policy of constant evolution, we reserve the right to modify the specifications in part or in whole without forewarning.
- All reproduction or third party concession of this manual is prohibited without the previous written authorization of our firm.

## 1.2. USING THIS MANUAL.

The purpose of this manual is to provide explanations and procedures for the installation, commissioning, maintenance and troubleshooting of UPS from **SLC TWIN** series. This manual has to be read carefully before installing and operating it. Keep this manual for future consults.

### 1.2.1. Used symbols and conventions..



«**Warning**» symbol. Carefully read the indicated paragraph and take the stated prevention measures.



«**Danger of electrical discharge**» symbol. Pay special attention to it, both in the indication on the equipment and in the paragraph referred to this instruction's manual.



«**Main protective earthing terminal**» symbol. Connect the earth cable coming from the installation to this terminal.



«**Notes of information**» symbol.



**Preservation of the environment:** The presence of this symbol in the product or in their associated documentation states that, when its useful life is expired, it will not be disposed together with the domestic residuals. In order to avoid possible damages to the environment, separate this product from other residuals and recycle it suitably. The users can contact with their provider or with the pertinent local authorities to be informed on how and where they can take the product to be recycled and/or disposed correctly.

### 1.2.2. For further information and/or help.

For further information and/or help of the version of your specific unit, request it to our Service and Technical Support department (**S.T.S.**).

### 1.2.3. Safety and first aid.

Together with the equipment and this «User and installation manual», it is provided the information relating to «Safety instructions» (See document EK266\*08). Before proceeding to the installation or commissioning, check that **both information** are available; otherwise request them. It is compulsory the compliance of the «Safety instructions», being the user the legal responsible regarding to its observance. Once read, keep them for future consults that can arise

## 2. QUALITY AND STANDARD GUARANTEING.

### 2.1. MANAGEMENT DECLARATION.

Our target is the client's satisfaction, therefore this Management has decided to establish a Quality and Environmental policy, by means of installation a Quality and Environmental Management System that becomes us capable to comply the requirements demanded by the standard **ISO 9001:2000** and **ISO 14001:2004** and by our Clients and concerned parts too.

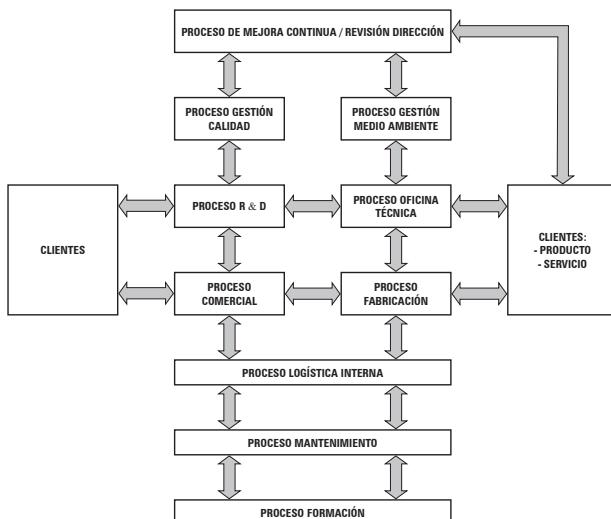
Likewise, the **SALICRU** Management is committed with the development and improvement of the Quality and Environmental Management System, through:

- The communication to all the company about the importance of satisfaction both in the client's requirements and in the legal and regulations.
- The Quality and Environmental Policy diffusion and the fixation of the Quality and Environment targets.
- To carry out revisions by the Management.
- To provide the needed resources.

#### Management agent

The Management has designated as management agent the person in charge about the Quality and Environment department, who with independence of other responsibilities, has the responsibility and authority: to assure that the processes of the quality and environmental management system are established and maintained; to inform to the Management about the operating of the quality and environmental management system, including the necessities for the improvement; and to promote the knowledge of the client's requirements and environmental requirements at all the levels of the organization.

In the next PROCESS MAP is represented the interaction among all the processes of the Quality and Environmental System of **SALICRU**:



**Fig. 0.** Quality and environment process map.

### 2.2. STANDARD.

The UPS product **SLC TWIN** series is designed, manufactured and commercialized in accordance with the standard **EN ISO 9001** of Quality Assurance. The **CE** marking shows the conformity to the EEC Directive (quoted between brackets) by means of the application of the following standards:

- **2006/95/EC** Low Voltage Safety.
- **2004/108/EC** Electromagnetic Compatibility (EMC).

In accordance with the harmonised standards. Reference standards:

- **EN 60950-1:** IT equipments. Safety. Part 1: General requirements.
- **EN 62040-2:** An interruptible power supply (UPS). Part 2: EMC requirements.
- **EN 62040-3:** An interruptible power supply (UPS). Part 3: methods of specifying the performance and test requirements.

### 2.3. ENVIRONMENT.

This product has been designed to respect the environment and has been manufactured in accordance with the standard ISO 14001.

#### Recycling the UPS SLC TWIN series at the end of its useful life:

**SALICRU** commits to use the services of authorised societies and according to the regulations, in order to treat the recovered product at the end of its useful life (contact your distributor).

**Packing:** To recycle the packing, by following the legal regulations in force.

**Batteries:** The batteries mean a serious danger for health and environment. The disposal of them must be done in accordance with the standards in force.

### 3. PRESENTATION.

This manual describes the installation and operating of the **SALICRU** Uninterruptible Power Supply (UPS) of **SLC TWIN** series as equipments that can operate in single or parallel (except models in rack 19") modes without needing a centralized bypass. The UPSs of **SLC TWIN** series ensure an optimal protection for any critical load, keeping the AC mains to the loads between the requested parameters and with no-break, during the fault, deterioration or fluctuations of the electrical commercial mains. And with the available wide model range (from 4kVA to 20kVA) allow adapting the model the end-user's needs.

The design and construction of UPS from **SLC TWIN** series has been done in accordance with the international standards.

Thanks to the PWM (Pulse Width Modulation) technology used in the UPSs of **SLC TWIN** series, they are compacts, colds, silent and with high efficiency.

A UPS from **SLC TWIN** series allows upgrading by means of additional modules connected in parallel of the same power rate, (except models in rack 19") in order to have redundancy (i.e.: N+1) or to increase the capacity of the system.

So, this series has been designed to maximize the availability of the critical loads and to ensure that your business is protected from fluctuations of voltage, frequencies, electrical noises, blackouts and mains faults, which are present in the energy distribution mains. This is the essential target of the UPSs of **SLC TWIN** series.

Furthermore, the 4, 5 and 6kVA equipments can also be supplied in 19" rack format.

This manual is applicable to the following models:

Model	Type
<b>SLC-4000-TWIN</b>	
<b>SLC-5000-TWIN</b>	
<b>SLC-6000-TWIN</b>	
<b>SLC-8000-TWIN</b>	
<b>SLC-10000-TWIN</b>	
<b>SLC-8000-TWIN/3</b>	
<b>SLC-10000-TWIN/3</b>	
<b>SLC-12000-TWIN/3</b>	
<b>SLC-15000-TWIN/3</b>	
<b>SLC-20000-TWIN/3</b>	
<b>SLC-4000-TWIN R (B0)</b>	Rack 19"
<b>SLC-5000-TWIN R (B0)</b>	
<b>SLC-6000-TWIN R (B0)</b>	
<b>SLC-4000-TWIN (B1)</b>	
<b>SLC-5000-TWIN (B1)</b>	
<b>SLC-6000-TWIN (B1)</b>	
<b>SLC-8000-TWIN (B1)</b>	
<b>SLC-10000-TWIN (B1)</b>	
<b>SLC-8000-TWIN/3 (B1)</b>	
<b>SLC-10000-TWIN/3 (B1)</b>	
<b>SLC-12000-TWIN/3 (B1)</b>	
<b>SLC-15000-TWIN/3 (B1)</b>	
<b>SLC-20000-TWIN/3 (B1)</b>	

### 3.1. VIEWS.

#### 3.1.1 Captions for the equipment view.

Some, or all, of the following symbols can be used in this manual and showed during the equipment operating. This is why, all the users have to get used with them and to understand their meaning.

SYMBOLS AND THEIR MEANING			
Symbol	Meaning	Symbol	Meaning
	Warning		Main protective earth
	High Voltage		Silenced alarm
	UPS ON / Battery Test		Overload
	UPS OFF		Battery
	UPS on standby or shutdown		Recycling
	Alternating current (AC)		Keep the UPS in a cooled place
	Direct Current (DC)		

#### 3.1.2. Rear, description and connectivity.

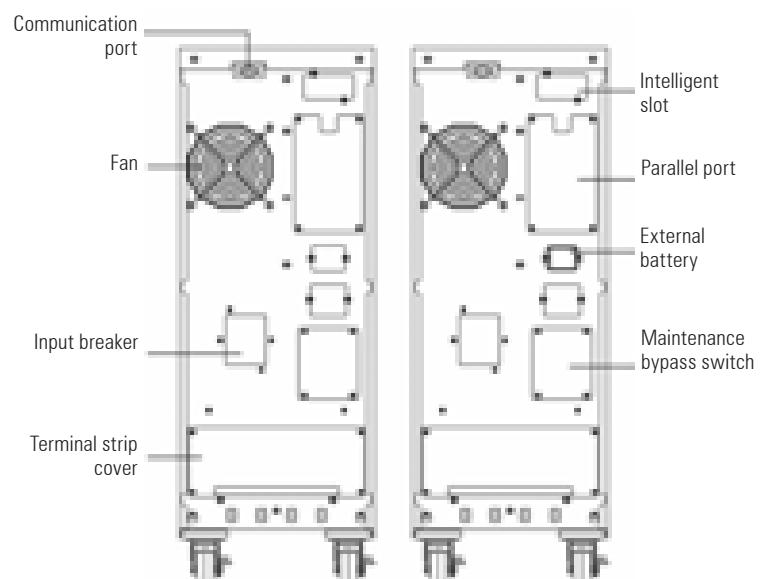
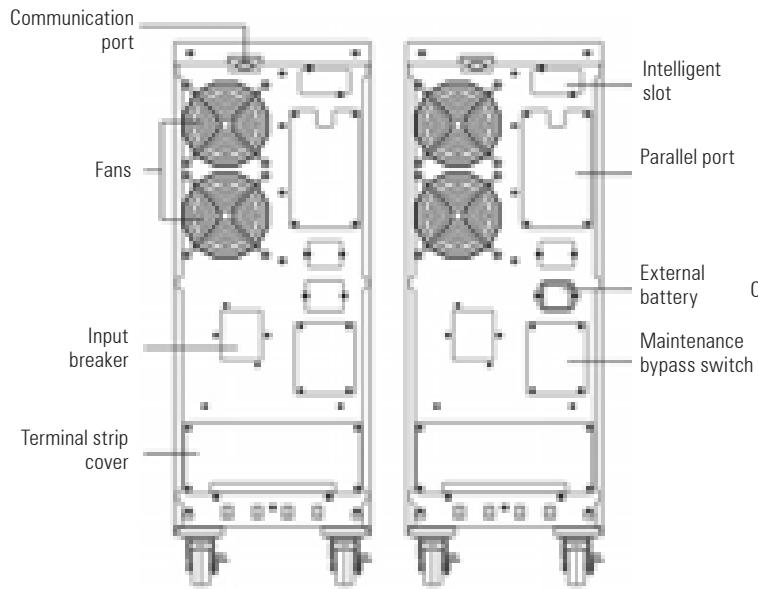
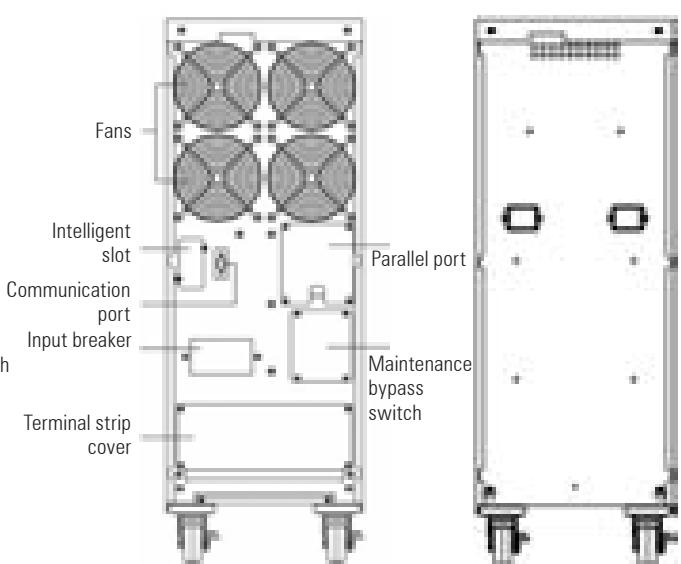


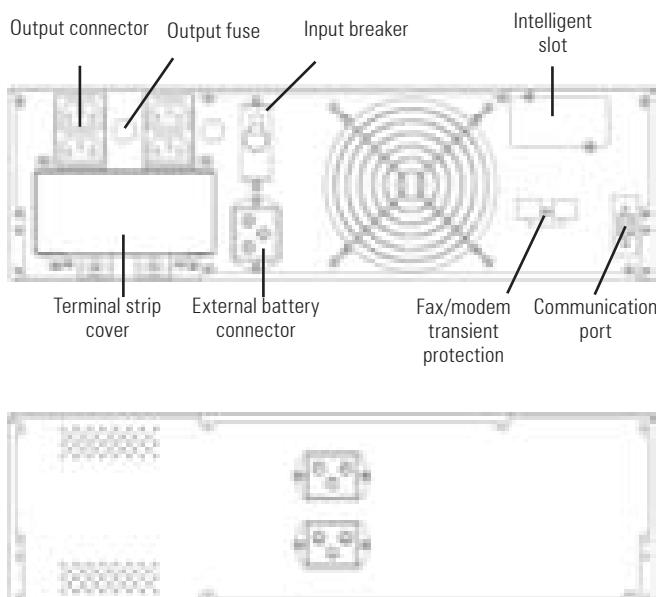
Fig. 1. Rear view of the 4, 5 and 6 kVA equipments



**Fig. 2.** Rear view of the 8 and 10 kVA equipments

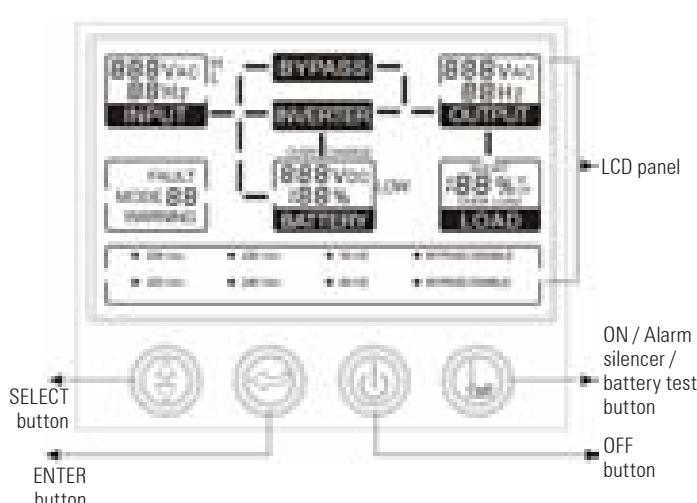


**Fig. 3.** Rear view of the 12, 15 and 20 kVA (equipment + battery cabinet - 40 x 9Ah)



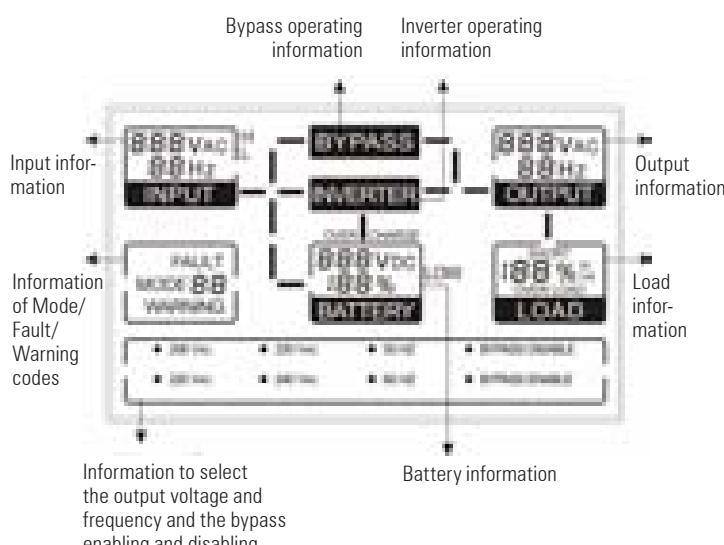
**Fig. 4.** Rear view of the 4, 5 and 6 kVA equipments and AMP AUT (10')

### 3.1.3. Control panel.



**Fig. 5.** Control panel for tower format equipments

Button	Function
<b>ON button</b>	By pressing the ON button, the UPS starts up, the acoustic alarm is deactivated. The battery test is turned on by pressing it for more than 1 second.
<b>OFF button</b>	By pressing the OFF button, the UPS goes to bypass mode and the inverter is shutdown. From now on, if the bypass and mains are active, the output terminals supply voltage through themselves.
<b>SELECT button</b>	The output voltage, frequency and the bypass enabling/disabling can be selected if the UPS is on bypass mode and if the SELECT button is pressed and confirmed by pressing ENTER.
<b>ENTER button</b>	



**Fig. 6.** LCD display fonctions

Summary of the main indications displayed by the LCD panel:

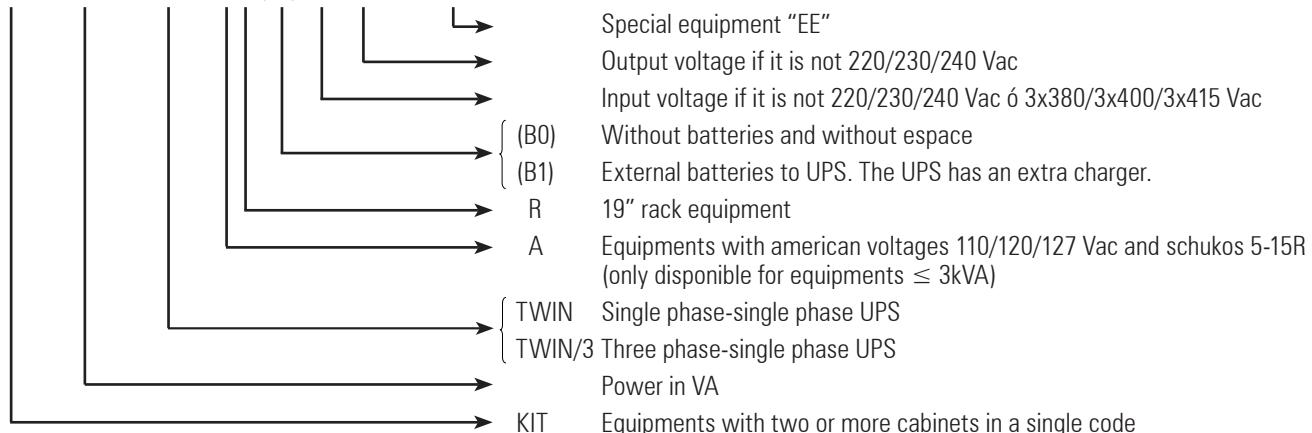
Display	Function
<b>Input infomation *</b>	
<b>230VAC</b>	It displays the input voltage value, which will be showed from 0 to 999 Vac.
<b>50Hz</b>	It displays the frequency value of the input voltage, which will be showed from 0 to 99 Hz.
<b>H</b>	It displays that the input voltage is higher than the SPEC range. If the voltage is normal, it will not be showed.
<b>L</b>	It displays that the input voltage is lower than the SPEC range. If the voltage is normal, it will not be showed.
<b>Output information</b>	
<b>230VAC</b>	It displays the output voltage value, which will be showed from 0 to 999 Vac.
<b>50Hz</b>	It displays the frequency value of the output voltage, which will be showed from 0 to 99 Hz.
<b>Load information</b>	
<b>100%</b>	It displays the % of the load in W or VA, the maximum value will be showed from 0 to 199% only.
<b>SHORT</b>	It displays that the output is short-circuited.
<b>OVERLOAD</b>	It displays that the load overcomes the SPEC range.
<b>Battery information</b>	
<b>230VDC</b>	It displays the battery voltage value, which will be showed from 0 to 999 Vdc.
<b>100%</b>	It displays the % of the battery capacity, which will be showed from 0 to 199%.
<b>OVERCHARGE</b>	It displays that the battery is overcharged, and the UPS could transfers to battery mode.
<b>LOW</b>	It displays that the battery is low and the UPS could be shutdown shortly.
<b>Information of Mode/Fault/Warning codes</b>	
<b>FAULT MODE 88 WARNING</b>	It displays the UPS operating mode. It will show the Mode/Fault/Warning codes or the parallel operating (except models in rack 19").
<b>Inverter operating information</b>	
<b>INVERTER</b>	It displays that the inverter is running.
<b>Bypass operating information</b>	
<b>BYPASS</b>	It displays that the bypass is activated.
<b>Information of output voltage and frequency and bypass enabling / disabling</b>	
<b>208 V<sub>AC</sub></b>	They are the four selectable output voltage values with the UPS on standby or bypass mode. One of them can be activated at the same time only.
<b>220 V<sub>AC</sub></b>	
<b>230 V<sub>AC</sub></b>	
<b>240 V<sub>AC</sub></b>	
<b>50 Hz</b>	They are the two selectable frequency values of the output voltage with the UPS on standby or bypass mode. One of them can be activated at the same time only.
<b>60 Hz</b>	
<b>BYPASS DISABLE</b>	Selection of bypass enabled/disabled selectable with the UPS on standby or bypass mode. One of them can be activated at the same time only.
<b>BYPASS ENABLE</b>	

\* For UPS model SLC 10000-TWIN/3 (B1), it will only display the information of phase T, meanwhile for SLC- 12000-TWIN/3 (B1) / SLC- 15000-TWIN/3 (B1) / SLC-20000-TWIN/3 (B1), it will only display the information of phase R.

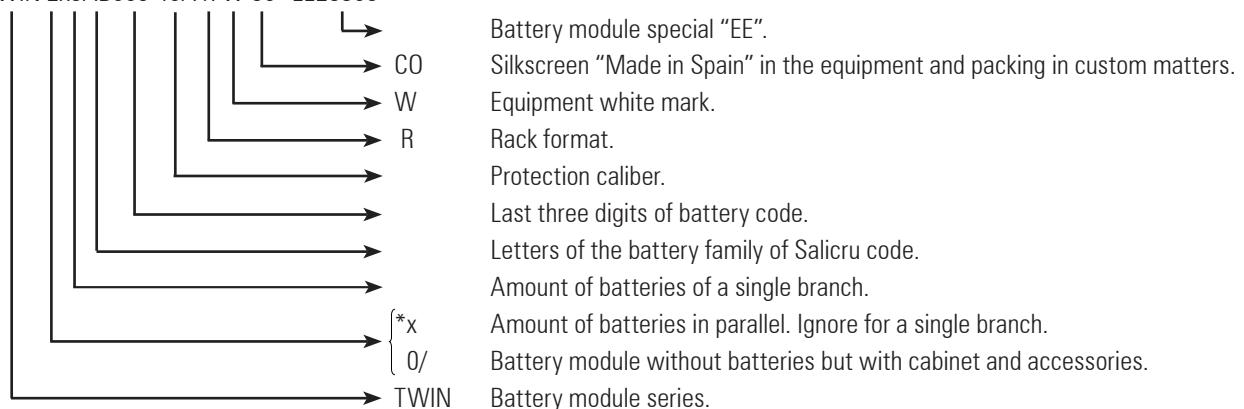
## 3.2. DEFINITION AND STRUCTURE.

### 3.2.1. Nomenclature.

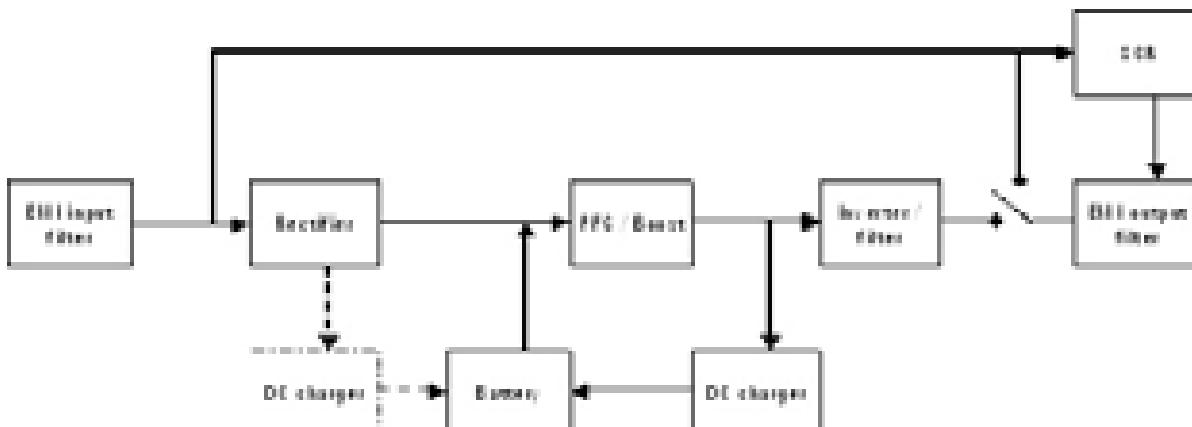
KIT SLC-8000-TWIN/3 A R (B1) 220/220 "EE29503"



MOD BAT TWIN 2x3AB003 40A R W CO "EE29503"



### 3.2.2. Structural diagram.



**(i)** The ticked lines mean the energy flow and the DC charger in equipments with extended autonomy.

**Fig. 7.** Single line diagram.

### 3.3. SYSTEM DESCRIPTION.

#### 3.3.1. Operating principle.

The UPS **SLC TWIN** series is a double conversion system AC/DC – DC/AC, with battery. This structure is the one that provides a higher reliability and protection of the output electrical power supply in small and medium UPS power rates.

The AC input voltage is converted to DC by means of a full wave thyristor rectifier. The rectifier output is connected to the input of the Power Factor Corrector (hereafter PFC).

The PFC boosts the DC voltage to optimal levels so the inverter converts that DC voltage into a AC sinewave voltage, which is stabilized in voltage and frequency, and ready to feed the loads. The batteries are connected to the PFC input through a powerful thyristor, for those cases that their energy is needed (mains fault or energy with poor quality).

The battery charger takes the energy from the PFC output (for equipments with standard autonomy), and adapts it to the optimal levels of the battery bank to charge.

This double conversion structure is complemented with two additional functional blocks, the bypass switch and the maintenance bypass switch.

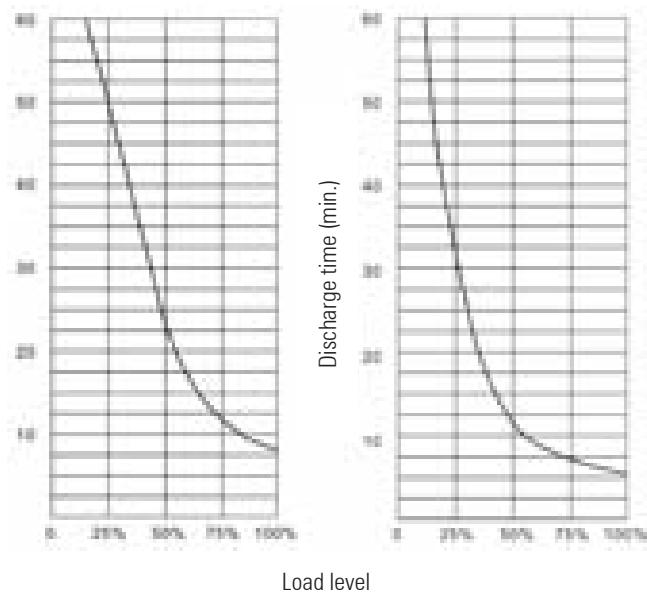
The bypass switch, is made up by two thyristors with anti parallel connection for the bypass line and a relay (contactor depending on the equipment) for the inverter line, connects the output load with the bypass line directly in those special conditions like overloads, overtemperatures, etc. And they are connected to the inverter again when the normal conditions are restored.

The manual bypass switch isolates the UPS from mains and the loads connected at its output.

#### 3.3.2. Back up time for standard models.

The back up time for those models with extended autonomy depends on the capacity of the external battery bank and load level, among other factors.

The back up time for standard models depends on the model and load level.



**Fig. 8.** Example of autonomy time variation between two models

### **3.4. OPTIONAL.**

Depending on the chosen configuration, your equipment could include any of the following optional:

#### **3.4.1. Isolation transformer.**

The isolation transformer, provides a galvanic insulation that allows isolating the output from the input completely.

The installation of a shield screen between the primary and secondary windings in the transformer provides a high attenuation of electrical noises.

The isolation transformer can be installed at the input or output of the UPS TWIN series and it will always be placed externally from the equipment's enclosure.

#### **3.4.2. External maintenance bypass.**

The purpose of this optional is to electrically isolate the equipment from mains and critical loads without breaking the power supply to the last ones. This way the maintenance or fixing tasks can be done in the equipment without breaking the power supply to the protected system, at the same time that we are avoiding unnecessary risks to the technical staff.

The basic difference between this optional and the manual bypass already built in the UPS enclosure consists in a better operating, because it allows the total UPS disconnection from the installation.

#### **3.4.3. Integration into IT networks through the SNMP adaptor.**

The big IT systems based on LANs and WANs that are made up servers with different operating systems has to include the control and management help at the managing system disposal. This help is got through the SNMP adaptor, which is universal accepted by the main software and hardware manufacturers.

The available SNMP optional for TWIN series is card type, in order to be inserted into the slot that UPS has in its rear side. Thanks to this format, it is avoided to have small devices around the UPS.

The connection of the UPS with the SNMP is internal, meanwhile the one from the SNMP to the IT network is done through a RJ45 10-base connector.

#### **3.4.4. AS-400 card.**

See section 4.7.2.

#### **3.4.5. USB port card.**

The UPS TWIN series has a USB port card as an option, which converts the traditional RS-232 port with DB9 format to a USB port (Universal Series Bus) type B.

This allows connecting the UPS with a personal computer (PC) easily.

The format of the USB optional is card type. It allows being inserted into the slot that the UPS has available in its rear side.

#### **3.4.6. Parallel cable.**

The parallel cable is used to do the parallel control communication among the equipments that make up a system.

All the models from TWIN series already have the parallel kit (except models in rack 19") as an intrinsic feature of the series. In case you need to upgrade the power of the equipment or to have redundancy by paralleling equipments with the same power rate, this cable is needed.

#### **3.4.7. MODBUS protocol.**

The big IT systems based on LANs and WANs, many times require that the communication with any element that is integrated inside the IT network is carried out by means of an industrial standard protocol.

One of the industrial standard protocols more used in the market is the MODBUS protocol. The TWIN series is also ready to be integrated in this type of environments through the external "WinPower CMC" card adaptor with MODBUS protocol.

## 4. INSTALLATION.

### 4.1. IMPORTANT SAFETY INSTRUCTIONS.



Read the following safety instructions before installing and starting up the equipment.

#### 4.1.1. Transport.

- Transport the UPS in the original packing in order to protect the equipment from jolts and impacts.

#### 4.1.2. Location.

- Condensation problems could happen when moving the UPS from cold area to heat one. The UPS has to be perfectly dry before being installed, therefore two hours of acclimatization should be allowed as minimum.
- Do not install the UPS close to water or dust environments.
- Do not install the UPS in places exposed to direct sunlight or close to heat sources.
- Do not block the cooling wholes of the UPS enclosure.

#### 4.1.3. Installation.

- Do not connect loads at the UPS output terminal that could overload it.
- Put the cables in order to avoid tripping with them.
- The UPS has to be handled by personal duly trained.
- A disconnection device, accessible and close to the UPS, has to be put in the building installation.
- The UPS is an equipment with permanent operating. This is why only qualified staff will be able to do the installation.

#### 4.1.4. Operating.

- Do not disconnect the cables of the mains from the UPS or from the distribution panel during operating. Because it means to break the earth from UPS and connected loads.
- The UPS supplies its own energy through its internal current power supply (batteries). Therefore, the output terminal strip of the UPS can be electrical live although the UPS is disconnected from the distribution panel.
- To disconnect completely the UPS, press the OFF button first and then disconnect the mains.
- Make sure that any fluid or strange object can enter inside the UPS.

### 4.1.5. Maintenance, service and faults.

- The UPS works with dangerous voltages. The repair has to be done by qualified staff only.



Electrical shock risk. Although the unit is disconnected from the electrical mains, there are internal parts in the UPS that are still connected to the batteries, therefore they are under dangerous voltage.

- Before doing any service and/or maintenance, disconnect the batteries and check that there is not any voltage in the terminals of the electrolyte capacitor of the bus (BUS-capacitors).
- Only staff appropriately familiarized with the batteries and with the additional warning measures can replace them and supervise the operations. Not authorized people should be kept away.



Electrocution risk. The battery circuit is not isolated from the input voltage. Dangerous voltages can exist between the battery and earth terminals. Before touching, check that there is not any voltage present.

- The batteries can cause electrocution and to produce a high short-circuit current. Take the precautionary measures stated below when working with batteries:
  - Take watches, rings and any metallic object off.
  - Use tools with insulated handles only and gloves.
- During battery replacement, install the same number and type.
- Do not catch fire to the batteries. Explosion danger.
- Do not open or destroy the batteries. Electrolyte spillage can hurt eyes and skin. It can be toxic.
- Replace the fuse by another one with the same size and type only, in order to avoid fire risks.
- Do not dismantle the UPS.

## 4.2. TO KEEP IN MIND.



The UPS has to be installed and wired by qualified staff only and according to the applicable safety regulations.

## 4.3. UNPACKING AND CONTENT CHECKING.

- Unpack and check the content:
  - One SAI.
  - One user's manual.
  - One serial communication cable and one parallel cable (except models in rack 19").
  - One battery cable (models with extended autonomy (B1) only and/or three phase input)
- Inspect the UPS with the purpose of detecting possible damages due to the transport. Do not start up the unit and notify immediately to the carrier and to your distributor if there is any damaged or missing part

#### 4.4. CONNECTION OF THE INPUT, OUTPUT AND PROTECTIVE EARTH WIRING.

##### 4.4.1. Notes for the installation.

1. The UPS has to be installed in a well cooled place, far from water, inflammable gases and corrosive agents.
2. Make sure that the front and rear cooling wholes of the UPS are not blocked. Leave 0,5 metres of space around the UPS as minimum.
3. Drops of water condensation can appear if the UPS is unpacked in a low temperature environment. In this case it is necessary to wait until the total unit is dry before proceeding to the installation and the starting up. Otherwise electrocution danger will exist.

##### 4.4.2. Installation.

The installation and wiring must be done according to the local codes and following the instructions of professional staff.

Due to safety, turn off the power supply before proceeding to the installation. The battery circuit breaker also needs to be turned off if it is a model with extended autonomy (version B1).

1. Open the terminal cover located in the rear side of the UPS. See diagram according to the model.
2. For the model SLC-4000-TWIN (B1) / SLC-5000-TWIN (B1) / SLC-6000-TWIN (B1) / SLC-8000-TWIN (B1), it is better to use UL1015 10AWG (6mm<sup>2</sup>) cable or any insulated one that complies with the AWG standard for the UPS input and output.
3. For the model SLC-10000-TWIN (B1) / SLC-10000-TWIN/3 (B1), it is better to use UL1015 8AWG (10mm<sup>2</sup>) cable or any insulated one that complies with the AWG standard for the UPS input and output.
4. For the models SLC-12000-TWIN/3 (B1) / SLC-15000-TWIN/3 (B1) / SLC-20000-TWIN/3 (B1), it is better to use UL1015 6AWG (25mm<sup>2</sup>) cable or any insulated one that complies with the AWG standard for the UPS input and output.



Do not use any conventional schuko wall outlet as input electrical panel because its size is lower than the UPS current. Combustion danger.

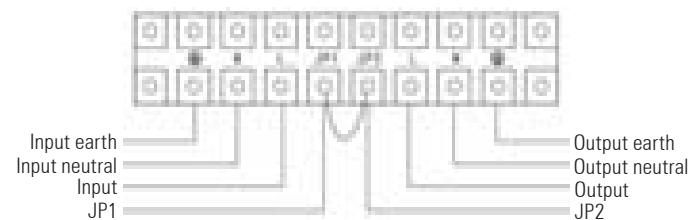
5. Connect the input and output cables to their corresponding UPS terminals and according to the model circuit diagram.



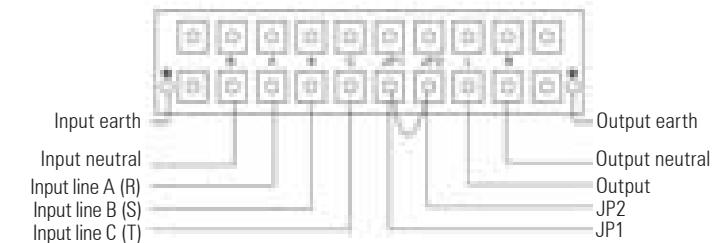
Tighten the connections.

6. The protective earth is the connection cable between the equipment that consumes energy and the earth cable. The diameter of such cable must be, as above stated, as minimum. The used colour code is green or green with yellow strip.

7. When concluding the installation, make sure that the wiring is correct.
8. Install a circuit breaker to protect the UPS output, if it were needed.
9. To connect the load with the UPS, turn off the loads first, make the connection and, finally, turn on the loads one by one.
10. Never mind if the UPS is connected to any load or not, voltage could exist at its output. The internal parts of the equipment can be live although the UPS is shutdown. To make sure that there is no output voltage, turn off the UPS and turn off the input power supply of the electrical panel.
11. It is better to charge the batteries for 8 hours before using them. After starting up, turn ON the circuit breaker. The UPS will charge the batteries automatically. The UPS can be used immediately without charging the batteries previously, but the expected autonomy will be lower than the standard value.
12. In case, it is needed to connect inductive loads to the UPS like laser printers, the inrush current of such loads should be calculated, in order to determine if the UPS power rate is enough to supply them.

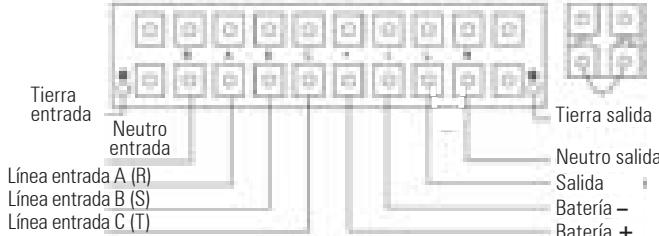


**Fig. 9.** Input and output terminal strip for SLC-4000-TWIN (B1) / SLC-5000-TWIN (B1) / SLC-6000-TWIN (B1) / SLC-8000-TWIN (B1) and SLC-10000-TWIN (B1)



**Fig. 10.** Input and output terminal strip for SLC-8000-TWIN/3 (B1) / SLC-10000-TWIN/3 (B1)

- i** If the UPS is set on single mode, JP1 and JP2 must be connected with a 10AWG (6mm<sup>2</sup>) cable. If the UPS is set on parallel mode, JP1 and JP2 must be disconnected.



**Fig. 11.** Input and output terminal strip for SLC-15000-TWIN/3 (B1) / SLC-12000-TWIN/3 (B1) / SLC-20000-TWIN/3 (B1)

**i** If the UPS is set on single mode, JP1 and JP2 have to be connected. If the UPS is set on parallel mode, the bridge between JP1 and JP2 have to be removed.

#### 4.5. PROCEDURE TO CONNECT THE MODELS WITH EXTERNAL BATTERIES FOR EXTENDED AUTONOMIES.

1. The DC nominal voltage of the external battery module is 240 Vdc. Each battery string has 20 maintenance free blocks of 12 V connected in serial. To achieve a higher autonomy time, additional battery modules can be connected, but always checking that they have the «same voltage and same type».
2. For SLC-4000-TWIN (B1) / SLC-5000-TWIN (B1) / SLC-6000-TWIN (B1) / SLC-8000-TWIN (B1) / SLC-8000-TWIN/3 (B1) / SLC-10000-TWIN (B1) / SLC-10000-TWIN/3 (B1) models, the external battery connector is used for, one side, to connect to the external battery connector of the UPS, and the other side has an Anderson and jack connector to connect it to the external battery module connector; for SLC-12000-TWIN/3 (B1) / SLC-15000-TWIN/3 (B1) and SLC-20000-TWIN/3 (B1) models, select the cable type UL1015 6AWG (25mm<sup>2</sup>) or any insulated one that complies with the AWG standard for the UPS battery wiring.



Risk of electrocution. Always connect the cable end first going to the UPS and then the cable end going to the battery cabinet.

#### 4.6. PARALLEL (NOT FOR MODELS IN RACK 19").

##### 4.6.1. Brief introduction to the redundancy.

N+X is usually the most reliable power structure. N means the minimum number of UPSs that the total load needs; X means the number of redundant UPSs, which means, the number of faulty UPSs that the system can allow simultaneously. The higher is X, the higher will be the reliability of the system. For those occasions where the reliability is the essential, N+X is the optimal mode.

If the UPS has the parallel cables, up to 3 UPSs can be connected in parallel to configure a sharing and redundant output power.

##### 4.6.2. Parallel installation.

1. Use the supplied cable of 25 pins, with 25 wires, cable on Y and shielded, like the UPS parallel cable. The length of the parallel cable is 3 metres as maximum.
2. Follow the UPS requirement for the input wiring strictly.
3. Connect the output cables of each UPS to an output panel with circuit breaker.
4. Disconnect the bridge between JP1 and JP2 from the terminal strip, and connect each output breaker to the general output breaker and then to the loads.

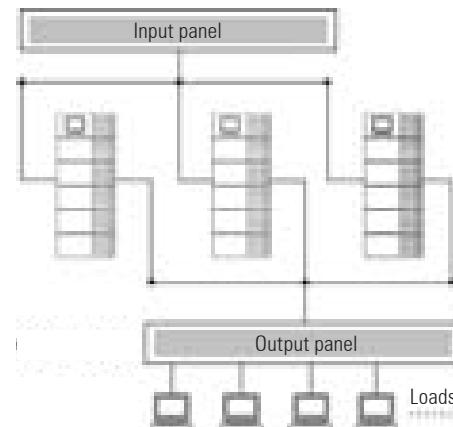
The output wiring requirement is as follows:

- When the distance among the UPSs in parallel and the circuit breaker panel is lower than 20 metres, the length difference between the input and output cables of the UPSs has to be lower than 20%.
- When the distance among the UPSs in parallel and the circuit breaker panel is higher than 20 metres, the length difference between the input and output cables of the UPSs has to be lower than 10%.

##### 4.6.3. Operating and maintenance.

1. For normal operating, follow the single operating requirement.
2. Start up: the units transfer to INV mode simultaneously keeping the start up Line mode sequence.
3. Shutdown: The units are shutdown on INV mode in a sequent way. When the last one is shutdown, each unit will turn off the inverter simultaneously and will transfer to bypass.

It is easy to handle the equipment, even without previous training. It is important to read this manual and to operate according to its instructions.



**Fig. 12.** Circuit diagram for input and output panels with parallel operating.

## 4.7. COMMUNICATION PORTS.

### 4.7.1. RS-232 interface.

Pin-out and DB-9 connector description:

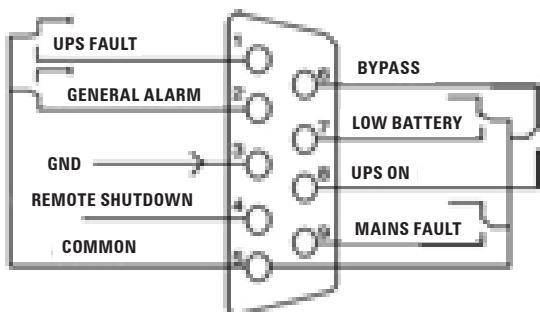
Pin #	Description	I/O
2	TXD	Output
3	RXD	Input
5	GND	Input

### 4.7.2. AS400 interface (Option).

Except for the above communication protocol, this UPS series has available the AS400 card (optional). Contact with the distributor for more details.

Pin-out and DB-9 connector description of the AS400 card.

Pin #	Description	I/O	Pin #	Description	I/O
1	Fallo SAI	Output	6	Bypass	Output
2	General alarm	Output	7	Low battery	Output
3	GND	Input	8	UPS ON	Output
4	Remote Shutdown	Input	9	Mains fault	Output
5	Common	Input			

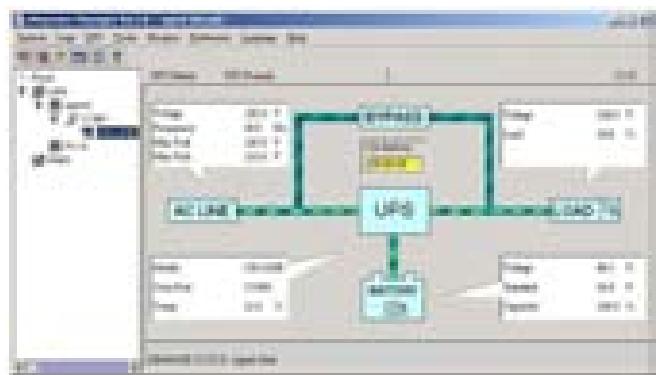


**Fig. 13.** DB-9 interface of AS400 communication protocol.

## 4.8. SOFTWARE.

### Free software - WinPower.

WinPower is the brand of the new UPS monitoring software, which facilitates a friendly monitoring and control interface. This software gives an automatic Shutdown for a system made by several PCs in case of mains failure. With this software, the users can monitor and control any SAI of the same IT network LAN without taking care about the distance among them.



### Installation procedure:

1. Insert the supplied CD. The installation assistance will boot automatically. Follow the stated steps by itself.

2. When it is asked, enter the serial number written over the CD.

When the PC reboots, the WinPower software will be showed as a plug icon with green colour in the system tray, near to the clock.

## 5. OPERATION.

### 5.1. START UP AND SHUTDOWN.

#### 1. Starting up the UPS with mains voltage (Line mode).

- a. After making sure that the connection with the power supply is correct, turn ON the circuit breaker of the battery module (models with extended autonomy only) and the input one, keeping this order. From now on the fan will start up and the UPS will supply power to the loads through the bypass line. The UPS is on bypass mode, code «01».
- b. Start up the UPS by pressing for more than 1 second the ON button. The buzzer will beep once.
- c. A few seconds later, the UPS switches to Line mode, code «02». If the mains voltage is not correct, the UPS will run on Battery mode without breaking the output voltage.

#### 2. Starting up the UPS without mains voltage (Battery mode).

- a. Make sure that the circuit breaker of the battery module is turned ON (models with extended autonomy only).
- b. Press the ON button for more than 1 second to start up the UPS. The buzzer will beep once. The UPS will run on No output mode, code «00».
- c. A few seconds later, the UPS will transfer to Battery mode, code «03».

#### 3. Shutdown the UPS with mains voltage (Line mode).

- a. Shutdown the UPS inverter by pressing the OFF button for more than 1 second. The buzzer will beep once and the UPS will transfer to Bypass mode.
- b. Once the shutdown is completed, the UPS still has voltage on its output. To turn it off definitely, just break the mains voltage and a few seconds later the LCD panel will be turned off and the output voltage will not be present.

#### 4. Shutdown the UPS without mains voltage (Battery mode).

- a. Shutdown the UPS by pressing the OFF button for more than 1 second. The buzzer will beep once.
- b. Once shutdown, the UPS will transfer to No output mode. Finally the LCD panel will be turned OFF and there will not be output voltage.

**Advice:** Turn off the connected loads before starting up the UPS. Later, once the UPS runs on INV mode, connect them one by one. Turn off all the loads before turning off the UPS.

### 5.2. PARALLEL OPERATING (NOT FOR MODELS IN RACK 19").

#### 1. Maintenance of the parallel device.

This UPS has a parallel device. To add or remove units from the system, follow the next procedure:

#### 2. Procedure to add a new UPS.

- a. Before installing it, prepare the input and output wiring, switches and parallel cable.
- b. Turn OFF the input and output breakers of the new unit. Connect its input, output and battery cables. Remove the bridge between JP1 and JP2 in the terminal strip.
- c. Shutdown the UPSs that are started up. Once all the UPSs are transferred to bypass, remove the cover of the maintenance bypass of each UPS, change the position of the maintenance switch from «UPS» to «BPS» and turn OFF the input circuit breaker of each UPS.
- d. If the UPS that it is started up is single, remove also the bridge between JP1 and JP2 of the terminal strip.
- e. Remove the cover of the parallel port from the new UPS, push one side of the parallel cable into the parallel kit slot and screw the connector; screw the parallel cover back.
- f. Remove the maintenance bypass cover from the new UPS and change the position of the switch from «UPS» to «BPS».
- g. Turn ON the battery switch and the external circuit breaker of the new UPS; measure the voltage difference between the output of the new UPS and the parallel system, in order to check if the voltage difference is lower than 1 V. If yes, turn ON the output circuit breaker. If the voltage difference is higher than 1 V, check the wiring.
- h. Remove the cover of the parallel port card located in the UPS, which has been done the maintenance bypass transference, and push the other parallel cable side into the parallel kit slot and fix the connector. Screw the cover of the parallel port back.
- i. Turn ON the input circuit breakers of all UPSs (including the new one) of the parallel system. Once all have transferred to Bypass mode, screw the maintenance bypass cover back.
- j. Start up each UPS and check its LCD panel. Make sure that each UPS has a normal operating and all has transferred to INV mode together. Measure the voltage in JP1 and JP2 in the terminal strip of each UPS in order to check if the voltage difference is lower than 1 V. If the quoted difference is higher than 1 V, the output relay of the UPS can't be closed.
- k. Measure the voltage between each JP2 of each UPS to check if the voltage difference is lower than 5 V (usually 2 V). If the difference is higher than 5 V, it means that the new UPS has to be set again or the parallel cable of the parallel kit has to be checked.

- I. Put all the equipments on Bypass and, next, remove the cover of the maintenance bypass of each UPS and move the maintenance switch from «BPS» to «UPS» and screw the cover back.

- m. Start up the UPSs on Line mode to operate in parallel operating.

**i** If the UPS is wrong with the above procedure, make the maintenance according to the steps to remove one UPS.

### 3. Procedure to remove one UPS.

- a. In case is needed to remove one UPS from the parallel system, which is running normal, press the OFF Button twice consecutively and that UPS will shutdown its output immediately.
- b. Turn OFF the circuit breakers of input, mains, output and battery of the UPS to remove.
- c. Press the OFF button of the rest of UPSs. Once all have transferred to Bypass mode, remove the maintenance bypass cover of each UPS, move the maintenance switch from «UPS» to «BPS» and turn OFF the input circuit breaker.
- d. Once removed the UPS, the bridge between JP1 and JP2 of the UPS terminal strip has to be done in case only one UPS will remain in the system.
- e. Once all the LCD panels are shutdown, remove the cover from the parallel port located in the UPS to remove, extract parallel cable and screw the cover back.
- f. Turn OFF all the input circuit breakers of the rest UPSs. Once all UPSs have transferred to Bypass mode, move the maintenance switch from «BPS» to «UPS» and screw the cover back. Put all the UPSs on Line mode to run on parallel.
- g. If the removed UPS will be used on single mode, JP1 and JP2 have to be bridged.

#### Parallel system warnings:

- a. When the system runs on inverter mode, make sure that all the maintenance switches of the UPSs are in the same position (either on «UPS» or on «BPS»).
- b. Enter into inverter mode before start up the system. The output circuit breaker has to be turned OFF.
- c. Do not touch the maintenance switch meanwhile the system runs on inverter mode.

### 5.3. CONTROL PANEL.

All the codes will be displayed in the LCD panel corresponding to their operating modes, as follows:

Operating mode	Code	Operating mode	Code
<b>Code table of Mode</b>			
No output mode	00	Battery mode	03
Bypass mode	01	Battery test mode	04
Line mode	02		
<b>Code table of Warning</b>			
ID lost	21	Charger fault	23
Fan error	22	Input fuse blown	24
<b>Code table of Fault</b>			
Bus fault	05	STS Bypass short-circuited	13
Inverter fault	06	Battery SCR short-circuited	14
Overload fault	07	Parallel communication fault	15
Overtemperature fault	08	Partial fault current Un	16
Inverter short-circuit	09	Model error	17
Communication fault	10	SCI RX error	18
Battery opened	27	Negative output power fault	20
Inverter relay short-circuited	12		

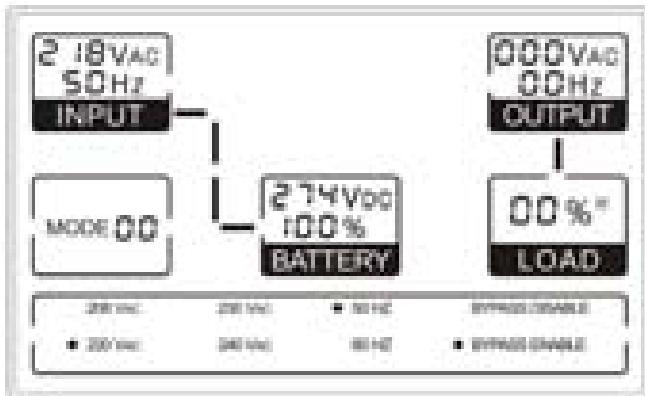
**Table 1.** Correspondence between codes and modes of operation.

Nr.	Operating		LCD panel code	Alarm
1	Output mode		00	None
2	Bypass mode		01	Beep every 2 minutes
3	Line Mode		02	None
4	Battery mode	0-20% of the battery capacity	03	Beep every second
		21%-100% of the battery capacity		Beep every 4 seconds
5	Battery test mode		04	None
6	Overload on Bypass mode		01	Beep twice every second
7	Overload on Line mode		02	Beep twice every second
8	Overload on Battery mode, previous warning		03	Beep twice every second
9	Fault BUS voltage		05	Continuous beeping
10	INVERTER damaged		06	Continuous beeping
11	Overload and no output		07	Continuous beeping
12	Overtemperature		08	Continuous beeping
13	Output short-circuit		09	Continuous beeping
14	Communication fault		10	Continuous beeping
15	Battery opened		27	Continuous beeping
16	INVERTER relay fault		12	Continuous beeping
17	BAT SCR fault		14	Continuous beeping
18	Fault parallel		15	Continuous beeping
19	ID lost		21	Beep every second
20	Fault fan		22	Beep every second
21	Charger and battery faulty		23	Beep every second

**Table 2.** Correspondence between alarms, codes and modes of operation.

## 1. No output mode.

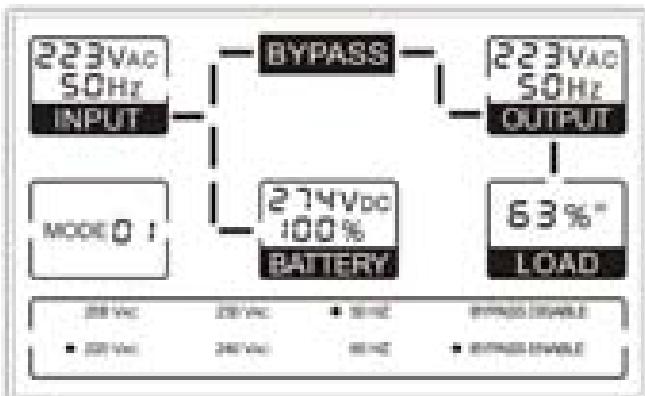
The LCD panel on no output mode is showed in the following diagram. The available displayed information is input, battery, UPS output and load. The operating mode code of the UPS is «00».



The UPS has no output on this mode.

## 2. Bypass mode.

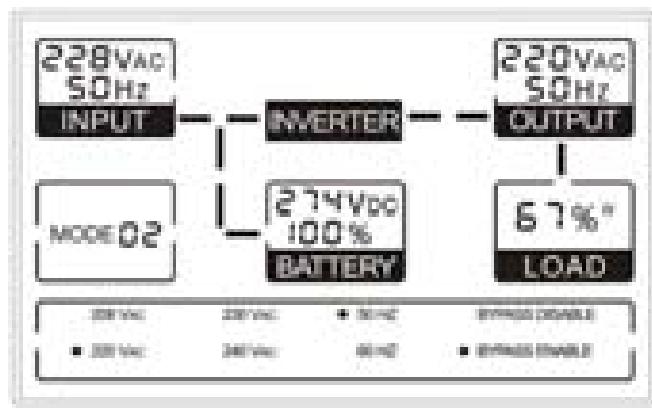
The LCD panel on Bypass mode is showed in the following diagram. The available displayed information is input, battery, UPS output and load. The operating mode code is «01». The «BYPASS» block means that the bypass is active. On this mode, the UPS will beep once every 2 minutes.



The UPS doesn't have available the autonomy function when it runs on Bypass mode. The power supply to the loads is given by the mains through an internal filter.

## 3. Line mode

The LCD panel on Line mode is showed in the following diagram. The available displayed information is input, battery, UPS output and load. The operating mode code is «02». The «INVERTER» block means that the inverter is active.



If the output is overloaded, the load percentage is displayed and the alarm will beep twice every second. It is better to disconnect, one by one, those loads that are not critical in order to decrease the load percentage under 90% of the UPS nominal power rate.

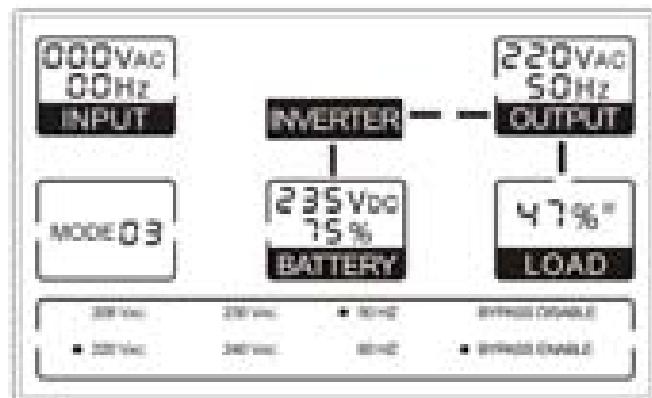
**Note:** To connect a generator or genset, proceed as follows:

- Turn on the generator and wait till its output is stabilized before supplying power to the UPS (make sure that the UPS is on bypass mode). Start up the UPS according to the start up procedure and connect the loads one to one.

## 4. Battery mode / Battery test mode.

The LCD panel on Battery mode is showed in the following diagram. The available displayed information is input, battery, UPS output and load. The «INVERTER» block means that the inverter is active.

- a. When the UPS is operating on Battery mode, the buzzer beeps one every 4 seconds. If the ON button of the front panel is pressed for more than 1 second again, the buzzer will stop. Press the ON button for more than 1 second to reactivate the alarm function.
- b. If the UPS runs on Battery mode and the input voltage mains is higher than the SPEC range, there will be displayed a «H» alarm symbol. Meanwhile, if the input voltage mains is lower than the SPEC range, there will be displayed a «L» alarm symbol. If there is not input mains, there will not be any symbol and both the voltage and frequency will be displayed as zero.

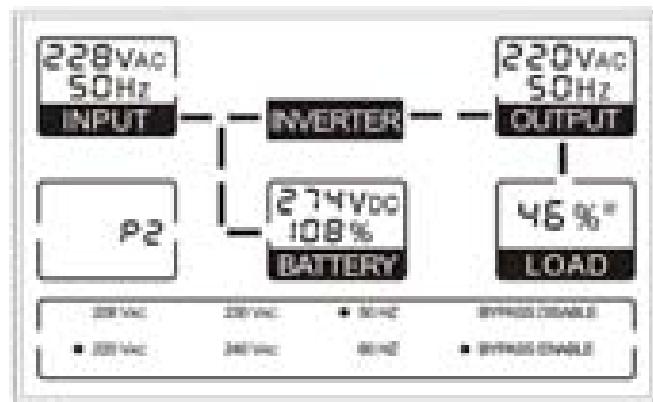


The LCD panel on Battery test mode is the same as the Battery mode, but the «H» and «L» symbols will not be displayed meanwhile the input voltage is not higher or lower than the SPEC range during the battery test period. The operating mode code of the UPS is «03» on Battery mode, and «04» on Battery test mode (to enter into this mode press «ON» for more than one second)

## 5. Parallel mode.

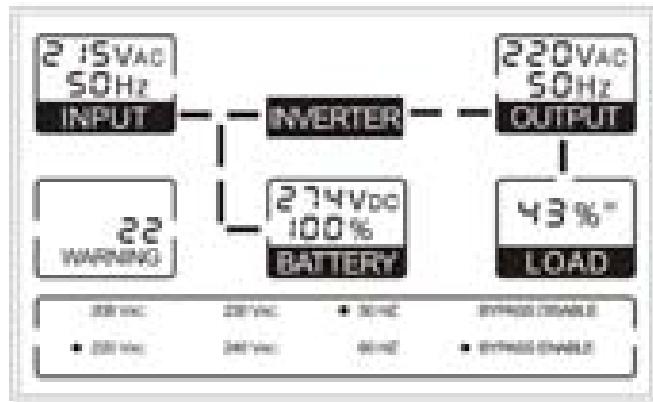
If the UPS runs on Parallel mode, the LCD panel will display the UPS number of the system.

The LCD panel on Parallel mode is showed in the following diagram. When the UPS runs on Parallel mode, the information of the code will be alternated between the «Pn» symbol and the code of the mode. The «P» symbol means that the UPS runs on Parallel mode, and «n» number means the parallel quantity.



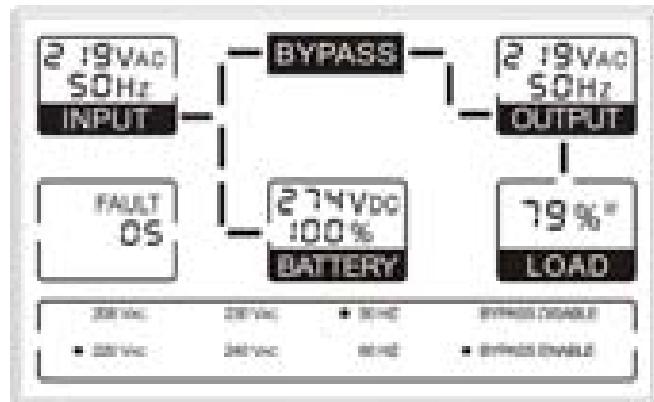
## 6. Warning mode.

The LCD panel on Warning mode is showed in the following diagram. The available displayed information is input, battery, UPS output and load. The «MODE» symbol will not be displayed and the «WARNING» will be displayed instead.



## 7. Fault mode.

The LCD panel on Fault mode is showed in the following diagram. The available displayed information is input, battery, UPS output and load. The «MODE» symbol will not be displayed and the «FAULT» will be displayed instead.



## 8. Communication fault mode.

If the mode code is «10», means an «internal communication fault » and the UPS will not display any information in the screen, less than the fault code, as the following diagram shows.



### 5.3.1. Settings.

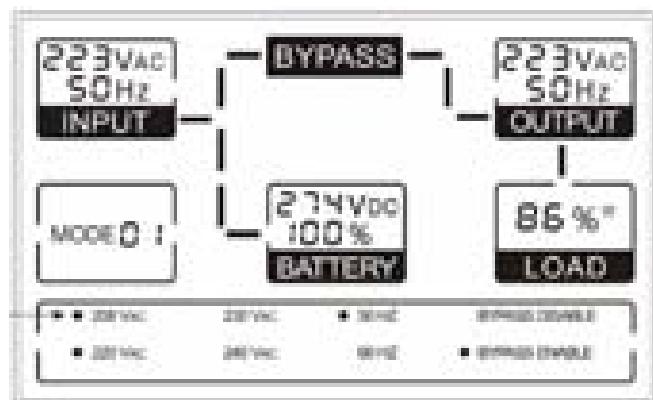
The output voltage range, output frequency and Bypass status can be set directly through the LCD panel. The output voltage range can be selected between 208V, 220V, 230V and 240V. The output frequency range can be set to 50Hz or 60Hz. The Bypass can be enabled or disabled. Nevertheless, the settings can only be done with the UPS on Bypass or No output modes.

On Bypass or No output mode, press the Select button of the LCD panel for more than one second and the black point will blink near to the «208V» serigraphy in the LCD panel. If we press the Select button again, the black point will move through the rest of measurements: «230V», «240V», «50Hz», «60Hz», «Bypass disable», «Bypass enable». When pressing the ENTER button for more than 1 second, the black point will not blink and the voltage range or output frequency or Bypass status will be modified by the selected one. In case the ENTER or Select buttons are not pressed in 10 seconds period, the black point will disappear without applying any changes.

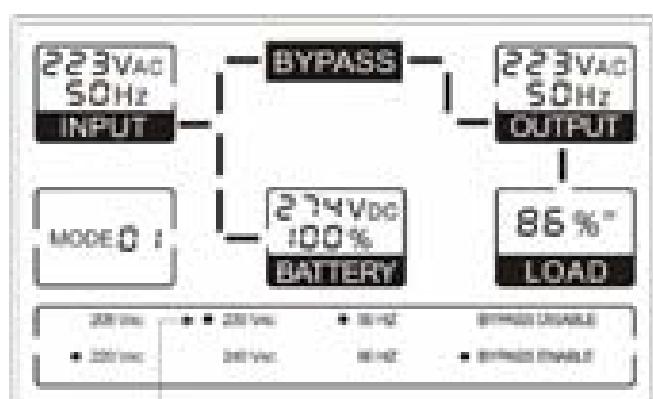
Only one voltage or frequency value can be selected at the same time, the values will be changed once the UPS is started up through the ON button.

The UPS will transfer to Bypass mode for a few seconds when «Bypass Enable» is selected, and to No output mode when «Bypass Disable» is selected.

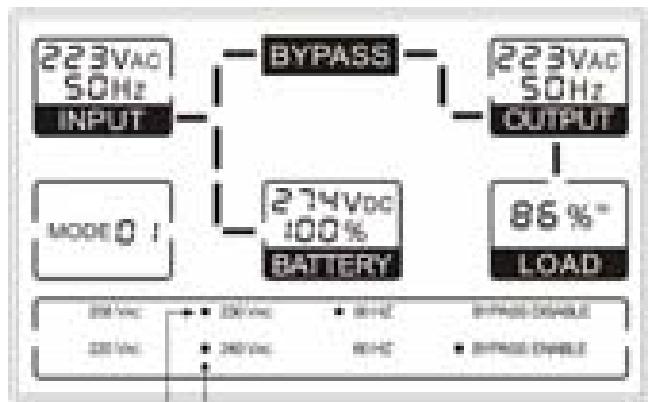
Example to change the output voltage from 220V to 230V through the LCD panel:



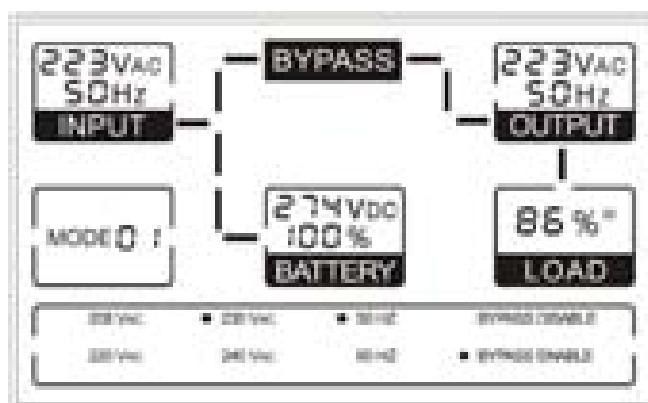
**STEP 1:** A black point will be displayed beside «208Vac» when pressing the Select button.



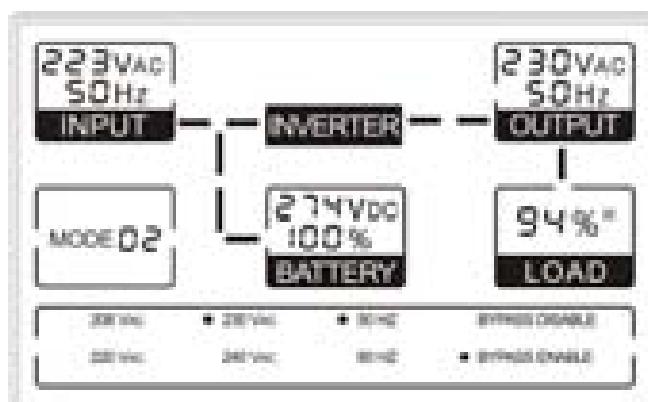
**STEP 2:** The point will be moved beside «230Vac» after pressing twice the Select button.



**STEP 3:** The point beside 230Vac will not blink when pressing ENTER. The blinking will go to the next one «240Vac».



**STEP 4:** The output voltage range has been modified to «230Vac». The UPS runs on Bypass mode.



**STEP 5:** The output voltage will be 230Vac as soon as the UPS is started up.

## **6. MAINTENANCE, WARRANTY AND SERVICE.**

### **6.1. BATTERY MAINTENANCE.**

- This UPS series only requires a minimum maintenance. The used battery into the standard models is lead acid, sealed, valve regulated and maintenance free. These models require a minimum of repairs only. The only requirement is to charge the UPS regularly to prolong the expected battery lifetime. Meanwhile it is connected to the mains power supply, never mind if the UPS is on or not, it will keep the batteries charged and will give a protection against overcharging and over discharging.
- The UPS has to be charged every 4 or 6 months, if it is not used for long time.
- In hot areas, the battery should be charged every 2 months. The standard charging period should be 12 hours as minimum.
- Under normal conditions, the battery lifetime is from 3 to 5 years. In such case that the battery were not in good conditions, it should be replaced before. The replacing has to be done by qualified staff.
- Always replace them with the same number and type.
- Do not replace one battery only. All the batteries have to be replaced together and according to the manufacturer's instructions.
- Usually, the batteries have to be charged and discharged every 4 or 6 months. The charging should start when the UPS would have shutdown due to a deep battery discharge. The charge time for a standard UPS should 12 hours as minimum.

### **6.2. NOTES FOR INSTALLING AND REPLACING THE BATTERY.**

1. Before installing the batteries, take rings, watches and bracelets off.
2. If it were needed to replace the connection of any cable, ask for original parts to authorised distributors or service centers in order to avoid overheatings or sparks with fire danger due to the inadequate size.
3. Do not throw the batteries to fire, explosion danger exists.
4. Do not open the batteries, the electrolyte spillage is very toxic and harmful for the skin and eyes.
5. Do not short-circuit the + and - poles of the batteries, electrocution or fire danger exists.
6. Make sure that there is not any voltage before handling the batteries. The battery circuit is not isolated from the input circuit . There could be dangerous voltages between the battery and earth terminals.
7. Although the input circuit breaker is turned off, internal parts of the UPS are still connected to the batteries, therefore dangerous voltage exists. So, before doing any repair or maintenance job, turn off the battery circuit breaker or remove the connection between battery blocks.
8. The batteries have dangerous voltages. The maintenance or replacing of the batteries has to be done by qualified staff, which should be familiarized with them. No other person should handle them.

### 6.3. TROUBLESHOOTING GUIDE.

Problem	Possible cause	Solution
The fault code is "08", and the buzzer beeps continuously.	The UPS transfers to fault mode due to an internal overheating.	Make sure that the UPS is not overloaded, the cooling wholes are not blocked and the ambient temperature is not so high. Wait 10 minutes to cool the UPS before start it up again. If the fault happens again, contact with the technical service(S.T.S.).
The fault code is "09", and the buzzer beeps continuously.	The UPS output is short-circuited.	Turn off all the loads. Shutdown the UPS. Make sure that the load is not damaged or that the UPS doesn't have internal faults before starting it up again. If the fault happens again, contact with the technical service(S.T.S.).
The fault code is "05" or "09", and the buzzer beeps continuously.	The UPS transfers to fault mode due to an internal fault.	Contact with the technical service(S.T.S.)
The Mode code is "03", the UPS transfers to Battery mode.	The mains voltage or frequency is out of input range of the UPS.	If the UPS is running on Battery mode. Save the data and close the application software. Make sure that the mains is inside the allowed voltage and frequency UPS ranges.
The fault code is "07", and the UPS beeps continuously.	The UPS is overloaded or the load is damaged.	Check the loads and turn off the non-critical ones. Recalculate the load and reduce the number of loads connected to the UPS. Check that they are not damaged.
The Warning mode is "23", the buzzer beeps every second.	The UPS charger is faulty.	Contact with the technical service(S.T.S.)
The code fault is "27", the UPS beeps continuously.	Low battery or not connected.	Check the battery. If it were damaged, replace it immediately and make sure that the battery breaker is turned "ON".
The mains is normal, but the UPS can't run on Line mode.	Maintenance switch loose	Contact with the technical service(S.T.S.)
The discharging time of the Battery is reduced.	The batteries has not been charged completely.	Keep the UPS connected to the mains for more than 10 hours to recharge the batteries again.
	UPS overloaded.	Check the loads and turn off the non-critical ones.
	Aged battery.	Replace the batteries. Contact with the S.T.S. to have spare parts and technical service.
The UPS is not started up after pressing the ON button.	The ON button has been pressed too short time.	Press the ON button for more than 1 second.
	The UPS is not connected to the battery or its voltage is too low.	Check the battery and recharge it.
	UPS fault.	Contact with the technical service(S.T.S.)

In case were needed to contact with the assistance service, provide the following information:

- Model and serial number of the UPS.
- Date of the problem.
- Complete description of the problem, including the LCD panel, code, alarm, output power condition and load capacity. If the UPS is a model with extended autonomy, the external battery pack has to be informed as well.

#### 6.4. WARRANTY CONDITIONS.

The limited warranty provided by **SALICRU, S.A.** only applies to those products that you acquire for commercial or industrial use in the normal development of your business.

##### 6.4.1. Covered product.

UNINTERRUPTIBLE POWER SUPPLY, **SLC TWIN** model.

##### 6.4.2. Warranty terms.

**SALICRU** guarantees this product against any parts and/or labour defect for 12 months period from its commissioning by **SALICRU** staff or other specifically authorised, or 18 months from its factory delivery, whichever expires first. In case of failure of the product inside the warranty period, **SALICRU** must repair, at your facilities at no cost, the faulty part or parts. The transport expenses and packaging will be borne to the user.

**SALICRU** guarantees for period time not lower than 10 years, the availability of parts and spare parts, as hardware as software, as well as a complete assistance regarding the repairs, components replacement and software updating.

##### 6.4.3. Out of scope of supply.

**SALICRU** is not forced by the warranty if it appreciates that the defect in the product doesn't exist or it was caused by a wrong use, negligence, installation and/or inadequate testing, tentative of repairing or not authorized modification, or any other cause beyond the foreseen use, or by accident, fire, lightning or other dangers. Neither it will cover, in any case, compensations for damages or injuries.

#### 6.5. DESCRIPTION OF THE AVAILABLE MAINTENANCE CONTRACTS AND SERVICE.

When the warranty is expired, **SALICRU**, adapting to the customer's needs, has several maintenance modalities:

- Preventive. It guarantees a higher safety to preserve the correct operating of the equipments with a yearly preventive visit, in which the specialised technicians of **SALICRU** make several tests and sets in the systems:

- Check and write down the input and output voltages and currents per phase.
- Check the logged alarms.
- Check the readings of the LCD panel.
- Other measurements.
- Check the fan status.
- Check the load level.
- Check the selected language.

- Check the correct location of the equipment.

- General cleaning of the equipment.

This way, it is guaranteed the perfect operating and the possible coming faults are avoided.

These supervisions are usually done without shutdown the equipment. In those cases that a shutdown were needed, a date and time would agree with the customer to do the task.

This maintenance modality covers, inside the working timetable, all the journey expenses and manpower.

- **Corrective.** When a fault occurs in the equipment operating, and previous notice to our Service and Technical Support (**S.T.S.**), in which a specialized technician will establish the failure scope and he will determine a first diagnostic, the corrective action starts.

The needed visits for its correct resolution are unlimited and they are included inside the maintenance modalities. It means that **SALICRU**, in case of failure, will check the equipments as many time as it were needed.

Besides, inside these two modalities, is possible to fix **the action timetable and response times** in order to be adapted to the customer's needs:

- LV8HLS.** Customer's attention from Monday to Friday from 9 h. to 18 h. The response time is inside the same day or, as maximum, in the next 24 hours of the fault notification.

- LS14HLS.** Customer's attention from Monday to Saturday from 6 h. to 20 h. Response time is inside the same day or, as maximum, at first time of the next working day.

- LD24HLS.** Customer's attention from Monday to Sunday 24 h., 365 days per year. Response time in less than two or three hours after the fault notification.

- **Additional arrangement: 1-m-cb.**

- Index 1.** It means the number of Preventive visits per year. It includes journey and manpower expenses inside the established timetable for each maintenance modality, as well as all the needed Correctives visits. Excluding all the parts and batteries in case of reparation.

- Index m.** It means to include all the parts.

- Index cb.** It means to includes the batteries.

#### 6.6. TECHNICAL SERVICE NETWORK.

The covering, as national as international, of Service and Technical Support (**S.T.S.**) points, are made up by:

##### At national level:

Andorra, Barcelona, Madrid, Bilbao, Gijon, A Coruña, Las Palmas de G.Canaria, Malaga, Murcia, Palma de Mallorca, San Sebastian, Santa Cruz de Tenerife, Seville, Taco (La Laguna - Tenerife), Valencia and Zaragoza.

##### At international level:

France, Brazil, Hungary, Portugal, Singapore, U.K., China, Mexico, Uruguay, Chile, Venezuela, Colombia, Argentina, Poland, Philippines, Malaysia, Pakistan, Morocco, Thailand, United Arab Emirates, Egypt, Australia and New Zealand.

## 7. ANNEXES.

### 7.1. GENERAL TECHNICAL SPECIFICATIONS.

<b>Rectifier</b>	
Technology	Thyristors+ DC/DC «Boost»
Nominal voltage	208 / 220 / 230 / 240 V (single phase input) 3 x 380 / 400 / 415 V (three phase input)
Input voltage range	176 ÷ 276 V (single phase input) 3 x 304 ÷ 478 V (three phase input)
Frequency	50 / 60 Hz ± 4Hz
Input / output efficiency at 100% load	> 88%
Power factor	≥ 0,98 (single phase input) ≥ 0,95 (three phase input)
<b>Inverter</b>	
Technology	PWM
Switching frequency	19.2 kHz
Nominal voltage	220 / 230 / 240 V
Accuracy	±1% (steady state) ±2% (dynamic state)
Frequency	50 / 60 Hz synchronised ± 4Hz Free running ± 0.05 Hz
Maximum slew rate	± 1 Hz/seg.
Wave shape	Sinewave
Voltage THD with linear load	< 2%
Voltage THD with non-linear load	< 6% (load in accordance with EN 62040-3)
Dynamic response time	< 5% for load steps of 50%-100%-50%
Overload on Line mode	130% for 10 min. > 130% for 1 s.
Sobrecarga modo batería	130% for 10 seg. > 130% for 1 s.
Permissible crest factor	3 to 1
Permissible power factor	0.7
<b>Static bypass</b>	
Type	Mixed (antiparallel thyristors + relay)
Nominal voltage	220 / 230 / 240 V
Nominal frequency	50 or 60 Hz ± 4 Hz
Overload	130%, alarm only, protections can trip > 130% for 1 min., then the output is broken.
<b>Internal charger</b>	
Technology	DC/DC «Flyback»
Charge type	P/U (Constant power /constant voltage)
Floating voltage accuracy	± 1 V
Maximum charging current	2 A (single phase input) 4 A (three phase input)
Standard recharging time	8 hours at 90% (tower format) 5 hours at 90% (19" rack format)
<b>Extra charger</b>	
Technology	DC/DC «Boost-Buck»
Charge type	P/U (Constant power /constant voltage)
Floating voltage accuracy	± 1 V
Maximum charging current	4 A (single phase input) Included in the standard equipment with three phase input
Recharging time	Depends on the battery capacity

<b>Generals</b>	
Type	On-line double conversion
Communication port	RS-232
Software	WinPower
Max. nr. or parallel equipments	3
Noise level	< 55 dB at 1m. (single phase input) < 60 dB at 1m. (three phase input)
Operating temperature	0°C ÷ +40°C
Storage temperature	-20°C ÷ +70°C, no batteries
Relative humidity	Up to 95%, non-condensing
Operating altitude	2400 m.a.s.l.
Protection degree	IP20
Safety	EN 62040-1; EN 60950-1; EN 60529
Operating	EN 62040-2
Electromagnetic compatibility (EMC)	EN 62040-3
Quality system	ISO 9001 e ISO 14001 7.2.

**i** If the UPS is installed in an altitude higher than 1000 metres, the output power rate will be reduced according to the following table:

Altitude (m.)	1000	1500	2000	2500	3000	3500	4000	4500	5000
Power	100%	95%	91%	86%	82%	78%	74%	70%	67%

## 7.2. PARTICULAR TECHNICAL SPECIFICATIONS

		SLC-***-TWIN					SLC-***-TWIN/3								
MODEL		4000	5000	6000	8000	10000	8000	10000	12000	15000	20000				
Nominal power (kVA)		4	5	6	8	10	8	10	12	15	20				
Active power (kW)		2,8	3,5	4,2	5,6	7	5,6	7	8,4	10,5	14				
<b>Batteries</b>															
Type		AGM sealed, 3-5 years													
Quantity		20, 7Ah			20, 9Ah			20x2, 9Ah							
<b>Dimensions</b>															
Tower	Dim. (mm)	575 x 260 x 717					575 x 260 x 717 (x2)								
	Weight (kg)	84 / 31 (B1)	87 / 32 (B1)	90 / 33 (B1)	92 / 34 (B1)	93 / 35 (B1)	98 / 37 (B1)	99 / 38 (B1)	48 / 48 (B1)	49 / 49 (B1)	50 / 50 (B1)				
Rack 19"	Dim. (mm)	600 x 483 x 3U					ND								
	Weight (kg)	14 / 64 (B1)	14.5 / 64 (B1)	15 / 64 (B1)							ND				

## 7.3. GLOSSARY.

### · AC

It is nominated as alternating current (CA in Spanish abbreviation and AC in English) to the electrical current in which the magnitude and direction varies in a cyclic way. The most common wave shape of the alternating current is sinewave, because the energy transmission is better. Nevertheless, some applications could need other period wave shapes, like triangular or square.

### · Boost

Direct converter of DC that supplies an output voltage higher than its input.

### · Bypass

Manual or automatic, it is the physical junction between the input and the output of an electrical device.

### · DC and AC

The direct current (CC in Spanish, DC in English) is the continuous electron flow through a cable between two points with different potential. Unlike the alternating current (CA in Spanish, AC in English), in direct current the electrical loads always flow in the same direction from the highest potential point to the lowest one. Although, usually the direct current is identified with the constant current (for example the one supplied by the battery), it is direct current any current that always maintain its polarity.

### · EMI filter

Filter, which is able to reduce the electromagnetic interference considerably. EMi is the perturbation that occurs in a radio transmission or any other electrical circuit caused by an electromagnetic perturbation coming from an external source. Also it is known as EMI due to its English acronym (ElectroMagnetic Interference), Radio Frequency Interference or RFI. This perturbation can break, damage or limit the efficiency of the circuit.

### · IGBT

The Insulated Gate Bipolar Transistor is a semiconductor device that is used as a controlled switch in power electronic circuits. This device has the feature of the gate signal of the effect field transistors with the capacity of high current and low voltage saturation of the bipolar transistor, combining an isolated FET gate for the input and control and a bipolar transistor as switch in a single device. The triggering circuit of the IGBT is as the MOSFET one, while the driving features are like the BJT.

### · Interface

In electronic, telecommunications and hardware, an interface (electronic) is the port (physical circuit) through which are sent or received signals from a system or subsystems toward others.

### · Inverter

An inverter, is a circuit used to convert direct current into alternating current. The function of an inverter is to change an input voltage of direct current into a symmetrical output voltage of alternating current, with the required magnitude and frequency by the user or the designer.

### · kVA

The voltampere is the unit of the apparent power in electrical current. In direct current is almost equal to the real power but in alternating current can differ depending on the power factor.

### · LCD

LCD acronym of Liquid Crystal Display, device invented by Jack Janning, who was employee of NCR. It is an electric system of data presentation based on 2 transparent conductor layers and in the middle a special crystal liquid that have the capacity to orientate the light when trespassing.

**· LED**

LED acronym of Light Emitting Diode, is a semiconductor device (diode) that emits light almost monochrome with a very narrow spectrum, it means, when it is direct polarized and it is crossed by an electric current. The colour, (wave longitude), depends on the semiconductor material used in its manufacturing, being able to vary from the ultraviolet one, going through the visible spectrum light, to the infrared, receiving these last ones the denomination of IRED (Infra Red Emitting Diode).

**· Circuit breaker**

A circuit breaker or switch, is a device able to break the electrical current of a circuit when it overcomes the maximum set values.

**· Off-Line mode**

Regarding to an equipment, it is Off-line when it is disconnected from the system, it is out of service, and usually has its power supply turned off, so it means that is shutdown.

**· On-Line mode**

Regarding to an equipment, it is on line when it is connected to the system, and it is in operation, and usually has its power supply turned on.

**· Rectifier**

In electronic, a rectifier is the element or circuit that allows to convert the alternating current into direct current. This is done by rectifier diodes, which can be solid state semiconductors, vacuum or gassy valves like the mercury vapour. Depending on the features of the alternating current power supply used, it is classified as single phase, when they are fed by a single phase electrical mains, or three phase when they are fed by the three phases. Depending on the rectification type, they can be half wave, when only one of the current semi-cycles is used, or full wave, where both semi-cycles are used.

**· Relay**

The relay (in French relais, relief) is an electromechanical device that works as a switch controlled by an electric circuit where, through an electromagnet, a set of contacts is moved and it allows to open or to close other independent electric circuits.

**· SCR**

Acronym of «Silicon Controlled Rectifier», commonly known as Thyristor: Semiconductor device of 4 layers that almost works as an ideal switch.

**· THD**

It is the acronym of Total Harmonic Distortion. The harmonic distortion takes place when the output signal of a system is not equal to the signal that goes in. This non-linearity affects to the wave shape, because the equipment has re-injected harmonics that are not in the input signal. Since they are harmonic, multiples of the input signal, this distortion is not so dissonant and it is less easy to detect





**Avda. de la Serra, 100  
08460 Palautordera  
BARCELONA  
Tel. +34 93 848 24 00  
902 48 24 00  
Fax. +34 94 848 11 51  
[comercial@salicru.com](mailto:comercial@salicru.com)  
Tel. (S.T.S.) 902 48 24 01  
Fax. (S.T.S.) +34 848 22 05  
[sst@salicru.com](mailto:sst@salicru.com)  
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